(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 December 2002 (05.12.2002)

PCT

(10) International Publication Number
WO 02/096199 A2

(51) International Patent Classification[7]: A01N 25/04

(21) International Application Number: PCT/US02/16032

(22) International Filing Date: 21 May 2002 (21.05.2002)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

PCT/US01/16550	21 May 2001 (21.05.2001)	US
09/926,521	14 November 2001 (14.11.2001)	US
09/988,352	19 November 2001 (19.11.2001)	US

(71) Applicant *(for all designated States except US)*: **MONSANTO TECHNOLOGY LLC** [US/US]; 800 North Lindbergh Boulevard, St. Louis, MO 63167 (US).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **PALLAS, Norman, R.** [US/US]; 21 Jamestown Farm Drive, Florissant, MO 63034 (US). **GILLESPIE, Jane, L.** [US/US]; 7229 Cornell Avenue, St. Louis, MO 63130 (US). **SINGH, Lata** [US/US]; 131 Tartan Green Boulevard, Ellisville, MO 63021 (US). **XU, Xiaodong, C.** [CN/US]; 537 Emanuel Court, Valley Park, MO 63088 (US).

(74) Agents: **PETRILLO, Kathleen, M.** et al.; Senniger, Powers, Leavitt & Roedel, One Metropolitan Square, 16th Floor, St. Louis, MO 63102 (US).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

(84) Designated States *(regional)*: ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *without international search report and to be republished upon receipt of that report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 02/096199 A2

(54) Title: STABLE LIQUID PESTICIDE COMPOSITIONS

(57) Abstract: Aqueous pesticidal concentrate emulsions or microemulsions are described which are storage stable after exposure to temperatures ranging from 60EC to -20EC.

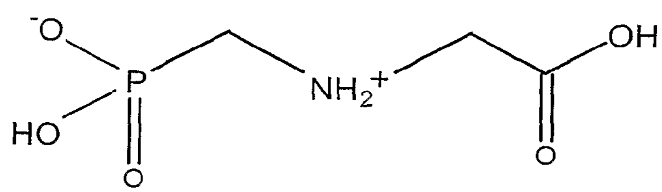
STABLE LIQUID PESTICIDE COMPOSITIONS

FIELD OF THE INVENTION

The present invention relates to stable pesticide emulsions and other liquid concentrates of water soluble pesticides such as N-phosphonomethylglycine (glyphosate). Herbicidal compositions of this invention comprise glyphosate or a salt or ester thereof, such as potassium glyphosate and a surfactant system including a cationic surfactant and optionally a nonionic surfactant. The invention also provides optically transparent, highly loaded glyphosate compositions containing cationic and nonionic surfactants having a cloud point of at least about 50°C and a crystallization point not greater than about -20°C.

BACKGROUND OF THE INVENTION

Glyphosate is well known in the art as an effective post-emergent foliar-applied herbicide. In its acid form, glyphosate has a structure represented by formula (1):



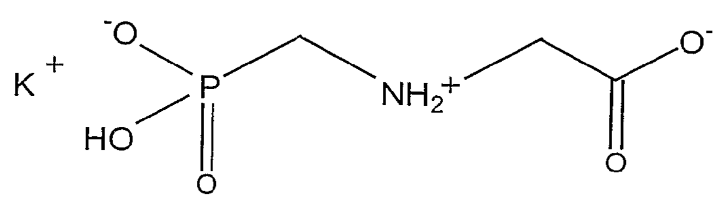
(1)

and is relatively insoluble in water (1.16% by weight at 25 C). For this reason it is typically formulated as a water-soluble salt.

Monobasic, dibasic and tribasic salts of glyphosate can be made. However, it is generally preferred to formulate glyphosate and apply glyphosate to plants in the form of a monobasic salt. The most widely used salt of glyphosate is the mono(isopropylammonium), often abbreviated to IPA, salt. Commercial herbicides of Monsanto Company having the IPA salt of glyphosate as active ingredient include Roundup®, Roundup® Ultra, Roundup® UltraMax, Roundup® Xtra and Rodeo® herbicides. All of these are aqueous solution

concentrate (SL) formulations and are generally diluted in water by the user prior to application to plant foliage. Another glyphosate salt which has been commercially formulated as SL formulations include the mono(trimethylsulfonium), often abbreviated to TMS salt, used for example in Touchdown® herbicide of Syngenta. Various salts of glyphosate, methods for preparing salts of glyphosate, formulations of glyphosate or its salts and methods of use of glyphosate or its salts for killing and controlling weeds and other plants are disclosed in U.S. Patent No. 4,507,250 to Bakel, U.S. Patent No. 4,481,026 to Prisbylla, U.S. Patent No. 4,405,531 to Franz, U.S. Patent No. 4,315,765 to Large, U.S. Patent No. 4,140,513 to Prill, U.S. Patent No. 3,977,860 to Franz, U.S. Patent No. 3,853,530 to Franz, and U.S. Patent No. 3,799,758 to Franz. The aforementioned patents are incorporated herein in their entirety by reference.

Among the water soluble salts of glyphosate known in the literature, but not known to be used commercially, is the potassium salt, having a structure represented by formula (2):



(2)

in the ionic form predominantly present in aqueous solution at a pH of about 4. This salt is disclosed, for example, by Franz in U.S. Patent No. 4,405,531 cited above, as one of the "alkali metal" salts of glyphosate useful as herbicides, with potassium being specifically disclosed as one of the alkali metals, along with lithium, sodium, cesium and rubidium. Example C discloses the preparation of the monopotassium salt by reacting the specified amounts of glyphosate acid and potassium carbonate in an aqueous medium.

Very few herbicides have been commercialized as their potassium salts. The Pesticide Manual, 11th Edition, 1997, lists as potassium salts the auxin type herbicides 2,4-DB ((2,4-dichlorophenoxy)butanoic acid), dicamba (3,6-dichloro-

2-methoxybenzoic acid), dichlorprop (2-(2,4-dichlorophenoxy)propanoic acid), MCPA ((4-chloro-2-methylphenoxy)acetic acid), and picloram (4-amino-3,5,6-trichloro-2-pyridinecarboxylic acid), the active ingredient of certain herbicide products sold by DowElanco under the trademark Tordon.

The solubility of glyphosate potassium salt in water is recorded in pending application Serial No. 09/444,766, filed November 22, 1999, the entire disclosure of which is incorporated herein by reference. As disclosed therein, glyphosate potassium salt has a solubility in pure water at 20 C of about 54% by weight, that is, about 44% glyphosate acid equivalent (a.e.) by weight. This is very similar to the solubility of the IPA salt. Concentrations expressed as percent by weight herein relate to parts by weight of salt or acid equivalent per 100 parts by weight of solution. Thus a simple aqueous solution concentrate of glyphosate potassium salt can readily be provided at a concentration of, for example, 44% a.e. by weight, comparable to that commercially obtainable with glyphosate IPA salt, as in the aqueous solution concentrate available from Monsanto Company under the name D-Pak. Somewhat higher concentrations can be obtained by slight over neutralization, 5 to 10% for example, of an aqueous solution of glyphosate potassium salt with potassium hydroxide.

A major advantage of the IPA salt over many other salts of glyphosate has been its compatibility in aqueous solution concentrate formulations with a wide range of surfactants. As used herein, the term “surfactant” is intended to include a wide range of adjuvants that can be added to herbicidal glyphosate compositions to enhance the herbicidal efficacy thereof, as compared to the activity of the glyphosate salt in the absence of such adjuvant, stability, formulability or other beneficial solution property, irrespective of whether such adjuvant meets a more traditional definition of “surfactant.”

Glyphosate salts generally require the presence of a suitable surfactant for best herbicidal performance. The surfactant can be provided in the concentrate formulation, or it can be added by the end user to the diluted spray composition. The choice of surfactant has a major bearing on herbicidal

performance. For example, in an extensive study reported in Weed Science, 1977, volume 25, pages 275-287, Wyrill and Burnside found wide variation among surfactants in their ability to enhance the herbicidal efficacy of glyphosate, applied as the IPA salt.

Beyond some broad generalizations, the relative ability of different surfactants to enhance the herbicidal effectiveness of glyphosate is highly unpredictable.

Surfactants tending to give the most useful enhancement of glyphosate herbicidal effectiveness are generally but not exclusively cationic surfactants, including surfactants which form cations in aqueous solution or dispersion at pH levels of around 4-5 characteristic of SL formulations of monobasic salts of glyphosate. Examples are long-chain (typically C_{12} to C_{18}) tertiary alkylamine surfactants and quaternary alkylammonium surfactants. An especially common tertiary alkylamine surfactant used in aqueous solution concentrate formulations of glyphosate IPA salt has been the very hydrophilic surfactant polyoxyethylene (15) tallowamine, *i.e.*, tallowamine having in total about 15 moles of ethylene oxide in two polymerized ethylene oxide chains attached to the amine group as shown in formula (3):

$$R - N\begin{cases}(CH_2CH_2O)_mH \\ (CH_2CH_2O)_nH\end{cases} \qquad (3)$$

wherein R is a mixture of predominantly C_{16} and C_{18} alkyl and alkenyl chains derived from tallow and the total of m+n is an average number of about 15.

For certain applications, it has been found desirable to use a somewhat less hydrophilic alkylamine surfactant, such as one having less than about 10 moles of ethylene oxide, as suggested in U.S. Patent No. 5,668,085 to Forbes et al., for example polyoxyethylene (2) cocoamine. That patent discloses illustrative aqueous compositions comprising such a surfactant together with the

IPA, ammonium or potassium salts of glyphosate. The highest concentration of glyphosate in the potassium salt formulations shown in Table 3 of the '085 patent is 300 g glyphosate a.e./l, with a weight ratio of glyphosate a.e. to surfactant of 2:1.

A class of alkoxylated alkylamines is disclosed in WO OO/59302 for use in herbicidal spray compositions. Potassium glyphosate solutions including various Jeffamine™ EO/PO propylamines or propyldiamines are described therein.

A wide variety of quaternary ammonium surfactants have been disclosed as components of aqueous solution concentrate formulations of glyphosate IPA salt. Illustrative examples are N-methylpolyoxyethylene (2) cocoammonium chloride, disclosed in European Patent No. 0274369, N-methylpolyoxyethylene (15) cocoammonium chloride, disclosed in U.S. Patent No. 5,317,003, and various quaternary ammonium compounds having formula (4):

$$(R^1)(R^2)(R^3)N^+\text{-}CH_2CH_2O\text{-}(CH_2CH(CH_3)O)_nH\ \ Cl^- \qquad (4)$$

where R^1, R^2 and R^3 are each C_{1-3} alkyl groups and n is an average number from 2 to 20, disclosed in U.S. Patent No. 5,464,807.

PCT Publication No. WO 97/16969 discloses aqueous solution concentrate compositions of glyphosate, in the form of the IPA, methylammonium and diammonium salts, comprising a quaternary ammonium surfactant and an acid salt of a primary, secondary or tertiary alkylamine compound.

Other cationic surfactants which have been indicated as useful in aqueous solution concentrate compositions of glyphosate salts include those disclosed in PCT Publication No. WO 95/33379. It is further disclosed in PCT Publication No. WO 97/32476 that highly concentrated aqueous compositions of glyphosate salts can be made with certain of these same cationic surfactants, with the further addition of a defined component that enhances stability of the

compositions. Glyphosate salts exemplified therein are the IPA salt and the mono- and diammonium salts.

A class of alkyletheramine, alkyletherammonium salt and alkyletheramine oxide surfactants has been disclosed in U.S. Patent No. 5,750,468 to be suitable for preparation of aqueous solution concentrate formulations of various glyphosate salts, the potassium salt being included in the list of salts mentioned. It is disclosed therein that an advantage of the subject surfactants when used in an aqueous composition with glyphosate salts is that these surfactants permit the glyphosate concentration of the composition to be increased to very high levels.

Anionic surfactants, except in combination with cationic surfactants as disclosed in U.S. Patent No. 5,389,598 and U.S. Patent No. 5,703,015, are generally of little interest in SL formulations of glyphosate IPA salt. The '015 patent discloses a surfactant blend of a dialkoxylated alkylamine and an anionic eye irritancy reducing compound. The surfactant blend is disclosed as being suitable for preparation of aqueous solution concentrate formulations of various glyphosate salts, the potassium salt being included in the list of salts mentioned. Concentrates of the '015 patent contain from about 5 to about 50%, preferably about 35% to about 45% glyphosate a.i. and from about 5 to about 25% surfactant. Further, PCT Publication No. WO 00/08927 discloses the use of certain polyalkoxylated phosphate esters in combination with certain polyalkoxylated amidoamines in glyphosate containing formulations. Potassium is identified as one of several salts of glyphosate noted as being "suitable."

Nonionic surfactants are generally reported to be less compatible with glyphosate than cationic or amphoteric surfactants when used as the sole surfactant component of SL formulations of glyphosate; exceptions appear to include certain alkyl polyglucosides, as disclosed for example in Australian Patent No. 627503. Other nonionics that have been disclosed as useful with glyphosate include polyoxyethylene (10-100) C_{16-22} alkylethers, as disclosed in PCT Publication No. WO 98/17109. Other nonionic surfactants are generally

mixed with cationic surfactants to form a compatible surfactant system for use in liquid herbicidal concentrates. However, cationic/nonionic surfactant systems generally do not provide acceptable low temperature storage stability. Concentrates containing these surfactant systems can crystallize at temperatures at or below about 0°C, limiting the use of such concentrates in cold climates.

Glyphosate concentrates containing nonionic alkylether and cationic amine surfactants are described in U.S. Patent No. 6,245,713. The surfactant mixture is said to enhance biological effectiveness of the glyphosate and provide enhanced rainfastness. Suitable glyphosates for use in the concentrates include sodium, potassium, ammonium, dimethylammonium, IPA, monoethanolammonium and TMS glyphosate salts. This patent is incorporated herein in its entirety by reference.

It is likely that serious consideration of glyphosate potassium salt as a herbicidal active ingredient has been inhibited by the relative difficulty in formulating this salt as a highly concentrated SL product together with preferred surfactant types. For example, a widely used surfactant in glyphosate IPA salt compositions, namely polyoxyethylene (15) tallowamine of formula (3) above, is highly incompatible in aqueous solution with glyphosate potassium salt. Further, PCT Publication No. WO 00/15037 notes the low compatibility of alkoxylated alkylamine surfactants in general with high-strength glyphosate concentrates. As disclosed therein, in order to "build in" an effective level of surfactant, an alkylglycoside surfactant is used in combination with an alkoxylated alkylamine surfactant to obtain high-strength concentrates containing the potassium salt of glyphosate.

The addition of such alkylglycosides resulted in higher viscosity formulations (as compared to formulations without alkylglycosides). Such an increase in the viscosity of these high-strength formulations is undesirable for various reasons. In addition to being more difficult to conveniently pour from the container or to wash residues therefrom, the deleterious effects resulting from

higher viscosity formulations is more dramatically observed with respect to pumping requirements. Increasing volumes of liquid aqueous glyphosate products are being purchased by end-users in large refillable containers sometimes known as shuttles, which typically have an integral pump or connector for an external pump to permit transfer of liquid. Liquid aqueous glyphosate products are also shipped in bulk, in large tanks having a capacity of up to about 100,000 liters. The liquid is commonly transferred by pumping to a storage tank at a facility operated by a wholesaler, retailer or cooperative, from which it can be further transferred to shuttles or smaller containers for onward distribution. Because large quantities of glyphosate formulations are purchased and transported in early spring, the low temperature pumping characteristics of such formulations are extremely important.

When such alkylglycosides (e.g., Agrimul™ APG-2067 and 2-ethyl-hexyl glucoside) are added to a glyphosate concentrate, the concentrate is dark brown in color. It is desirable for a glyphosate concentrate to be lighter in color than the alkylglycoside-containing concentrates as disclosed in WO 00/15037, which have a color value of about 10 to 18 as measured by a Gardner colorimeter. When dye is added to a glyphosate concentrate having a Gardner color of 18, the concentrate remains dark brown in color. Concentrates having a Gardner color value of 10 are difficult to dye a wide variety of colors, for example blue, green, red or yellow, as is often desired to distinguish the glyphosate product from other herbicidal products.

It would be desirable to provide a storage-stable aqueous concentrate composition of the potassium salt of glyphosate having an agronomically useful surfactant content, or that is "fully loaded" with surfactant. These formulations exhibit a reduced viscosity such that they may be pumped with standard bulk pumping equipment at 0°C at rates of at least 7.5 gallons per minute, usually more than 10 gallons per minute and preferably greater than 12.5 gallons per minute. An "agronomically useful surfactant content" means containing one or more surfactants of such a type or types and in such an amount that a benefit is

realized by the user of the composition in terms of herbicidal effectiveness by comparison with an otherwise similar composition containing no surfactant. By "fully loaded" is meant having a sufficient concentration of a suitable surfactant to provide, upon conventional dilution in water and application to foliage, herbicidal effectiveness on one or more important weed species without the need for further surfactant to be added to the diluted composition.

By "storage-stable," in the context of an aqueous concentrate composition of glyphosate salt further containing a surfactant, is meant not exhibiting phase separation on exposure to temperatures up to about 50 °C, and preferably not forming crystals of glyphosate or salt thereof on exposure to a temperature of about 0 °C for a period of up to about 7 days (i.e., the composition must have a crystallization point of 0 °C or lower). For aqueous solution concentrates, high temperature storage stability is often indicated by a cloud point of about 50 °C or more. Cloud point of a composition is normally determined by heating the composition until the solution becomes cloudy, and then allowing the composition to cool, with agitation, while its temperature is continuously monitored. A temperature reading taken when the solution clears is a measure of cloud point. A cloud point of 50 °C or more is normally considered acceptable for most commercial purposes for a glyphosate SL formulation. Ideally the cloud point should be 60 °C or more, and the composition should withstand temperatures as low as about -10 °C, preferably as low as about -20 °C, for up to about 7 days without crystal growth, even in the presence of seed crystals of the glyphosate salt.

A surfactant that is described herein as "compatible" with a glyphosate salt at specified surfactant and glyphosate a.e. concentrations is one that provides a storage-stable aqueous concentrate as defined immediately above containing that surfactant and salt at the specified concentrations.

Users of liquid herbicidal products typically meter the dosage by volume rather than by weight, and such products are usually labeled with directions for suitable use rates expressed in volume per unit area, *e.g.*, liters per hectare

(l/ha) or fluid ounces per acre (oz/acre). Thus the concentration of herbicidal active ingredient that matters to the user is not percent by weight, but weight per unit volume, *e.g.*, grams per liter (g/l) or pounds per gallon (lb/gal). In the case of glyphosate salts, concentration is often expressed as grams of acid equivalent per liter (g a.e./l).

Historically, surfactant-containing glyphosate IPA salt products such as Roundup® and Roundup® Ultra herbicides of Monsanto Company have most commonly been formulated at a glyphosate concentration of about 360 g a.e./l. The surfactant-containing glyphosate TMS salt product Touchdown® of Zeneca has been formulated at a glyphosate concentration of about 330 g a.e./l. Products at lower a.e. concentration, *i.e.*, more dilute, are also sold in some markets, but carry a cost penalty per unit of glyphosate they contain, primarily reflecting packaging, shipping and warehousing costs.

Further benefits in cost savings and in convenience to the user are possible if a "fully loaded" aqueous concentrate composition, or at least one having an agronomically useful surfactant content, can be provided at a glyphosate concentration of at least about 320 g a.e./l, 340 g a.e./l, or significantly more than 360 g a.e./l, for example at least about 420 g a.e./l or more, or at least 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 660 g a.e./l or more.

At very high glyphosate a.e. concentrations such as these, a significant problem normally occurs. This is the difficulty in pouring and/or pumping of the aqueous concentrate arising from the high viscosity of the concentrate, especially as manifested at low temperatures. It would therefore be highly desirable to have a highly concentrated aqueous solution of glyphosate potassium salt fully loaded with an agronomically useful surfactant, such formulation preferably being less viscous than glyphosate potassium salt formulations containing alkylglycoside surfactants, such as those disclosed in PCT Publication No. WO 00/15037.

As will be clear from the disclosure that follows, these and other benefits are provided by the present invention.

SUMMARY OF THE INVENTION

Among the several features of the invention, therefore, may be noted the provision of a liquid concentrate pesticidal composition useful in agriculture wherein a water-soluble herbicide can be formulated with a surfactant system so as to withstand temperatures as low as about -10 °C, preferably as low as about -20 °C, for at least about 7 days without phase separation and without crystal growth, even in the presence of seed crystals of the herbicide; the provision of such a composition which is stable after storage at about 50 °C for at least 14 days, preferably at about 60 °C or more for at least 28 days; the provision of such a composition that allows for higher loading of herbicidal active ingredients and full loading of surfactants; and the provision of such a storage-stable composition having a broad weed control spectrum that is relatively easy to use.

Briefly, therefore, the present invention is directed to an aqueous pesticidal concentrate microemulsion composition comprising a water-soluble pesticide dissolved in an aqueous medium, a substantially water-immiscible organic solvent, and a surfactant component. The water-soluble pesticide is present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant. The surfactant component comprises one or more surfactants present in a concentration sufficient to provide acceptable temperature stability of the microemulsion such that the microemulsion has a cloud point of at least about 50°C and a crystallization point not greater than about -10°C. The concentrate composition is optically transparent.

The invention is also directed to a liquid herbicidal concentrate emulsion composition having a continuous aqueous phase and a discontinuous oil phase. The composition comprises glyphosate predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-

propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof, an oil phase comprising a substantially water-immiscible organic solvent, and a surfactant component. The glyphosate is in solution in the aqueous phase in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to foliage of a susceptible plant. The surfactant component is in solution or stable suspension, emulsion, or dispersion in the aqueous phase, and comprises one or more surfactants present in a concentration sufficient to provide acceptable temperature stability of the emulsion such that the emulsion has a cloud point of at least about 50°C and a crystallization point not greater than about -10°C.

Yet another embodiment of the present invention is directed to an aqueous pesticidal concentrate microemulsion composition comprising a water-soluble pesticide dissolved in an aqueous medium, a substantially water-immiscible organic solvent and a surfactant component. The water-soluble pesticide is present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant. The surfactant component comprises at least one cationic surfactant and at least one nonionic surfactant, and is present in a concentration sufficient to provide acceptable temperature stability of the emulsion such that the emulsion has a cloud point of at least about 50°C and a crystallization point not greater than about -10°C.

Another embodiment of the invention is directed to a liquid herbicidal concentrate emulsion composition having a continuous aqueous phase and a discontinuous oil phase. The emulsion comprises a water-soluble herbicide dissolved in the aqueous phase, an oil phase comprising a substantially water-immiscible organic solvent, and a surfactant component. The water-soluble herbicide is present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant. The surfactant component comprises at least one cationic

surfactant, and the surfactant component is present in a concentration sufficient to provide acceptable temperature stability of the emulsion such that the emulsion has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

Still another embodiment of the invention is directed to an aqueous herbicidal concentrate composition comprising a water-soluble herbicide dissolved in an aqueous medium and a surfactant component. The water-soluble herbicide is present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant. The surfactant component comprises at least one cationic surfactant; and one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound. The compounds are present in an amount which enhances the compatibility of the surfactant component with the herbicide. The surfactant component is present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

Yet another embodiment of the invention is directed to an aqueous herbicidal concentrate composition comprising a water-soluble herbicide dissolved in an aqueous medium, and a surfactant component. The water-soluble herbicide is present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant. The surfactant component comprises at least one cationic surfactant and at least one nonionic surfactant, and is present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

DETAILED DESCRIPTION

Liquid pesticidal concentrates, especially those containing potassium glyphosate in combination with surfactants, are known to be difficult to stabilize against phase separation at elevated temperatures or crystallization at low temperatures. It has been discovered that the compatibility of a cationic surfactant, or a mixture of cationic and nonionic surfactants, with a water-soluble herbicide within a liquid herbicidal concentrate can be significantly improved by adding certain amine or quaternary ammonium salt compounds to the concentrate. These compounds are referred to herein as "stabilizers." Concentrates containing such surfactants in combination with the stabilizer also exhibit optical clarity and enhanced temperature stability, and provide improved weed control when diluted and applied to foliage. Amine or quaternary ammonium salt compounds comprising an alkyl or aryl substituent having from about 4 to about 22 carbon atoms and not more than ten ethylene oxide linkages within the compound are effective in enhancing the compatibility of such surfactants, even in concentrates containing at least 400 g glyphosate a.e. per liter and with a glyphosate:surfactant weight ratio of between about 1:1 and 20:1. The compatibility is particularly enhanced for surfactants that are otherwise incompatible with the water-soluble herbicide. For example, potassium glyphosate concentrates comprising 5-15 wt% cationic surfactants, or mixtures of these cationic surfactants and nonionic surfactants, are storage stable when the stabilizer is added.

It has also been discovered that the low temperature storage stability of liquid herbicidal concentrates containing cationic and nonionic surfactants can be significantly improved by adding a substantially water-immiscible solvent to the concentrate to form an emulsion. Emulsions containing a solvent, such as Aromatic 150 or Isopar L, often exhibit a 10°C improvement in low temperature storage stability as compared to similarly loaded herbicidal compositions which do not include the solvent. The emulsions can be formulated to remain optically clear during storage. Preferably, the concentrate is formulated as a

microemulsion which remains optically transparent when stored for at least about 7, 14 or 28 days.

It has also been discovered that, when the surfactant component of the liquid herbicidal concentrate composition also includes an amine containing alkylene oxide linkages, lowering the degree of alkoxylation improves the low temperature storage stability of the composition. For example, a glyphosate composition containing an alkyl etheramine having not more than eight ethylene oxide linkages exhibit a crystallization point not greater than about -10°C, as compared to a similarly loaded glyphosate composition comprising an alkyl etheramine having ten ethylene oxide linkages which exhibits a crystallization point not greater than about 0°C.

In an embodiment of the invention, an aqueous herbicidal concentrate composition is provided which comprises a water-soluble herbicide dissolved in water. The water-soluble herbicide is present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant. The composition also comprises a surfactant component in solution or stable suspension, microemulsion, or dispersion in the water. The surfactant component comprises one or more cationic surfactants, or a mixture of one or more cationic surfactants and one or more nonionic surfactants. The surfactant component is present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

Preferably, the cationic surfactant comprises a stabilizer of the invention, that is, one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound. These compounds enhance the compatibility of the surfactant component with the herbicide, enhance the optical clarity and temperature

stability of the composition, and provide improved weed growth control when the composition is diluted with water and applied to foliage.

In another embodiment of the invention, a substantially water-immiscible organic solvent is added to this composition to form a microemulsion. When the solvent is present in the concentrate composition, the storage stability of the composition is improved by decreasing the crystallization point by about 10°C. Such compositions exhibit a crystallization point not greater than about -10°C or even about -20°C if desired.

The liquid herbicidal concentrate aqueous and oil emulsion of the invention comprises a continuous aqueous phase containing a water-soluble herbicide dissolved therein. The water-soluble herbicide is present in a concentration that is biologically effective when the emulsion is diluted in a suitable volume of water and applied to the foliage of a susceptible plant. The oil phase of the emulsion comprises the substantially water-immiscible organic solvent. The emulsion also comprises a surfactant component in solution or stable suspension, emulsion, or dispersion in the water. The surfactant component comprises one or more surfactants present in a concentration sufficient to provide acceptable temperature stability of the emulsion such that the emulsion has a cloud point of at least about 50°C, preferably about 60°C and a crystallization point not greater than about -10°C, preferably about -20°C. Such low temperature storage stability is desirable in colder climates to maintain a pourable and pumpable homogeneous composition.

In a preferred embodiment, a temperature stable microemulsion is formed. A microemulsion is an optically transparent composition which remains stable when stored within a given temperature range. Microemulsions are described by K. Holmberg in an article entitled "When oil and water mix and mingle" (visited November 18, 2001) <http://www.responseonline.com/tech/emul.htm>. The term "optically transparent" or "clear" is defined as a complete lack of any visible nonuniformity

when viewed in mass, in bottles or test tubes, by strong transmitted light for purposes of this invention.

Microemulsions of the invention are easily prepared by well known methods and using standard equipment in the art. A beaker or laboratory pot is adequate for low volume purposes, while larger volumes may be processed in standard industrial agitated tankage including reactors, dissolvers and bulk tanks. Agitation requirements are not critical and agitation need only be adequate to provide a homogeneous formulation. Medium speed agitation with stir bars, or agitators fitted with standard industrial props are preferred. Baffled tanks are preferred in industrial applications as a means to reduce vortexing and air entrainment, and to minimize the agitator prop speed required to achieve desired homogeneity. Heated or jacket vessels are preferred. High shear and high speed mixing are not preferred if excessive air entrapment in the formulation can occur. The composition constitutents may be added in any order into a suitable vessel. Preferably, the surfactant is first added followed by the stabilizer, water and the pesticide. Surfactants that are not flowable at the processing temperature may optionally be melted prior to formulation, or preferably melted in the processing equipment before the balance of the components are added.

Preferably, the surfactant system comprises a stabilizer of the invention, that is, one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 22 carbon atoms and not more than ten C_2-C_5 alkylene oxide linkages within the compound. These compounds enhance the compatibility of the surfactant component with the herbicide, enhance the optical clarity and temperature stability of the microemulsion, and provide improved weed growth control when the microemulsion is diluted with water and applied to foliage.

It is also preferred that the surfactant component comprises one or more cationic surfactants, or a mixture of one or more cationic surfactants and one or more nonionic surfactants.

The liquid concentrate compositions of the invention preferably comprise a water-soluble herbicide in a concentration between about 10 and about 60 % by weight of the composition, a surfactant component in a concentration between about 0.5 and about 30 % by weight of the composition and a stabilizer and/or a solvent component. The concentrations of the stabilizer and the solvent component are between 0 and about 30% and 0 and about 15% by weight of the composition, respectively.

In one embodiment of the invention the liquid concentrate composition preferably comprises glyphosate or a salt or ester thereof in a concentration between about 25 and about 50% by weight of the composition, a surfactant component in a concentration between about 1 and about 30% by weight of the composition, and a stabilizer in a concentration between about 0.01 and about 25% by weight of the composition. Even more preferably, the composition comprises glyphosate or a salt or ester thereof in a concentration between about 30 and about 47% by weight of the composition, a surfactant component in a concentration between about 2 and about 17% by weight of the composition, and a stabilizer in a concentration between about 0.05 and about 20% by weight of the composition. Most preferably, the composition comprises glyphosate or a salt or ester thereof in a concentration between about 32 and about 44% by weight of the composition, a surfactant component in a concentration between about 3 and about 15% by weight of the composition, and a stabilizer in a concentration between about 0.1 and about 15% by weight of the composition.

In another embodiment of the invention the liquid concentrate composition of the invention preferably comprises glyphosate or a salt or ester thereof in a concentration between about 25 and about 50% by weight of the composition, a surfactant component in a concentration between about 1 and about 30% by weight of the composition, and a solvent component in a concentration between about 0.01 and about 10% by weight of the composition. Even more preferably, the composition comprises glyphosate or a salt or ester thereof in a concentration between about 30 and about 47% by weight of the

composition, a surfactant component in a concentration between about 2 and about 17% by weight of the composition, and a solvent component in a concentration between about 0.05 and about 7% by weight of the composition. Most preferably, the composition comprises glyphosate or a salt or ester thereof in a concentration between about 32 and about 44% by weight of the composition, a surfactant component in a concentration between about 3 and about 15% by weight of the composition, and a solvent component in a concentration between about 0.1 and about 5% by weight of the composition.

In yet another embodiment of the invention the liquid concentrate composition of the invention preferably comprises glyphosate or a salt or ester thereof in a concentration between about 25 and about 50% by weight of the composition, a surfactant component in a concentration between about 1 and about 30% by weight of the composition, a stabilizer in a concentration between about 0.01 and about 25% by weight of the composition, and a solvent component in a concentration between about 0.01 and about 10% by weight of the composition. Even more preferably, the composition comprises glyphosate or a salt or ester thereof in a concentration between about 30 and about 47% by weight of the composition, a surfactant component in a concentration between about 2 and about 17% by weight of the composition, a stabilizer in a concentration between about 0.05 and about 20% by weight of the composition, and a solvent component in a concentration between about 0.05 and about 7% by weight of the composition. Most preferably, the composition comprises glyphosate or a salt or ester thereof in a concentration between about 32 and about 44% by weight of the composition, a surfactant component in a concentration between about 3 and about 15% by weight of the composition, a stabilizer in a concentration between about 0.1 and about 15% by weight of the composition, and a solvent component in a concentration between about 0.1 and about 5% by weight of the composition.

Compositions of the invention have a viscosity of not greater than about 1000 cPs at 10 C, preferably not greater than about 900 cPs at 10°C, more

preferably not greater than about 800, 700, 600, 500, 400 or 300 cPs at 10°C, and even more preferably not greater than about 200 cPs at 10°C, at 45/s shear rate.

The term "water-soluble" as used herein in relation to a herbicide or salt or ester thereof means having a solubility in deionized water at 20°C of not less than about 50 g/l. Preferred water-soluble herbicides have a solubility in deionized water at 20°C of not less than about 200 g/l. Particularly preferred water-soluble herbicides have a herbicidal active acid or anionic moiety and are most usefully present in a composition of the invention in the form of one or more water-soluble salts. The aqueous phase of the composition can optionally contain, in addition to the water-soluble herbicide, other salts contributing to the ionic strength of the aqueous phase.

A particularly preferred group of water-soluble herbicides are those that are normally applied post-emergence to the foliage of plants. While the invention is not limited to any particular class of foliar-applied water-soluble herbicide, it has been found to provide useful benefits for compounds that rely at least in part for their herbicidal effectiveness on systemic movement in plants. Systemic movement in plants can take place via apoplastic (non-living) pathways, including within xylem vessels and in intercellular spaces and cell walls, via symplastic (living) pathways, including within phloem elements and other tissues composed of cells connected symplastically by plasmodesmata, or via both apoplastic and symplastic pathways. For foliar-applied systemic herbicides, the most important pathway is the phloem, and the present invention is believed to provide the greatest benefits where the water-soluble herbicide is phloem-mobile. However, compositions of the invention can also be useful where the water-soluble herbicide is non-systemic, as in the case of paraquat.

Water-soluble herbicides suitable for use in compositions of the invention include acifluorfen, acrolein, amitrole, asulam, benazolin, bentazon, bialaphos, bromacil, bromoxynil, chloramben, chloroacetic acid, clopyralid, 2,4-D, 2,4-DB, dalapon, dicamba, dichlorprop, difenzoquat, diquat, endothall, fenac,

fenoxaprop, flamprop, flumiclorac, fluoroglycofen, flupropanate, fomesafen, fosamine, glufosinate, glyphosate, imazameth, imazamethabenz, imazamox, imazapic, imazapyr, imazaquin, imazethapyr, ioxynil, MCPA, MCPB, mecoprop, methylarsonic acid, naptalam, nonanoic acid, paraquat, picloram, quinclorac, sulfamic acid, 2,3,6-TBA, TCA, triclopyr and water-soluble salts thereof.

Phloem-mobile herbicides that are preferred for use in compositions of the invention include but are not limited to aminotriazole, asulam, bialaphos, clopyralid, dicamba, glufosinate, glyphosate, imidazolinones such as imazameth, imazamethabenz, imazamox, imazapic, imazapyr, imazaquin and imazethapyr, phenoxies such as 2,4-D, 2,4-DB, dichlorprop, MCPA, MCPB and mecoprop, picloram and triclopyr. A particularly preferred group of water-soluble herbicides are salts of bialaphos, glufosinate and glyphosate. Another particularly preferred group of water-soluble herbicides are salts of imidazolinone herbicides.

Compositions of the invention can optionally contain more than one water-soluble herbicide in solution in the aqueous phase.

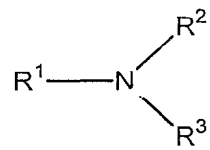
An especially preferred water-soluble herbicide useful in a composition of the present invention is glyphosate, the acid form of which is alternatively known as N-(phosphonomethyl)glycine. For example, glyphosate salts useful in compositions of the present invention are disclosed in U.S. Patents No. 3,799,758 and No. 4,405,531. Glyphosate salts that can be used according to the present invention include but are not restricted to alkali metal, for example sodium and potassium, salts; ammonium salt; C_{1-6} alkylammonium, for example dimethylammonium and isopropylammonium, salts; C_{1-6} alkanolammonium, for example monoethanolammonium, salt; C_{1-6} alkylsulfonium, for example trimethylsulfonium, salts; and mixtures thereof. The N-phosphonomethylglycine molecule has three acid sites having different pKa values; accordingly mono-, di- and tribasic salts, or any mixture thereof, or salts of any intermediate level of neutralization, can be used. Especially preferred glyphosate salts include the potassium salt, isopropylamine salt, ammonium salt, diammonium salt,

monoethanolamine salt, and trimethylsulfonium salt. The potassium salt is most preferred.

The relative amount of potassium glyphosate loading in the microemulsion herbicidal composition of the present invention will vary depending upon many factors including the surfactant system and stabilizers employed, the rheological characteristics of the composition, and the temperature range at which the composition will be exposed. The potassium glyphosate loading in the herbicidal compositions of the invention is preferably at least 320 g a.e./L, and more preferably at least 330, 340, 350, 360, 370, 380, 390, 400, 410, 420, 430, 440, 450, 460, 470, 480, 490, 500, 510, 520, 530, 540, 550, 560, 570, 580, 590, 600, 610, 620, 630, 640, 650, 660, 670, 680, 690 or 700 g a.e./L.

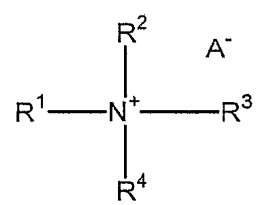
The stabilizers of the invention generally function by facilitating the dispersion of the composition surfactants within the water containing dissolved glyphosate. The stabilizers allow surfactants, in the presence of salts or electrolytes, to be added and subsequently dispersed into water at higher concentrations or at lower viscosities of the formulation than is otherwise achieved using only surfactant and water. Suitable stabilizers include primary, secondary or tertiary C_4 to C_{16} alkyl or aryl amine compounds, or the corresponding quaternary ammonium compounds. Such stabilizers greatly enhance the compatibility of certain glyphosate salts (e.g., potassium or isopropylamine) with surfactants that otherwise exhibit low or marginal compatibility at a given glyphosate loading. Suitable alkyl or aryl amine compounds may also contain 0 to about 5 C_2-C_4 alkylene oxide groups, preferably ethylene oxide groups. Preferred alkylamine compounds include C_6 to C_{12} alkylamines having 0 to 2 ethylene oxide groups. Similarly, etheramine compounds having 4 to 12 carbons and 0 to about 5 ethylene oxide groups, as well as the corresponding quaternary ammonium compounds, also enhance the compatibility of such formulations. In one embodiment, the compounds which

enhance the compatibility of such surfactants include amines or quaternary ammonium salts having the formula:



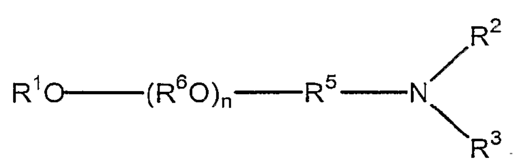
(5)

or



(6)

or



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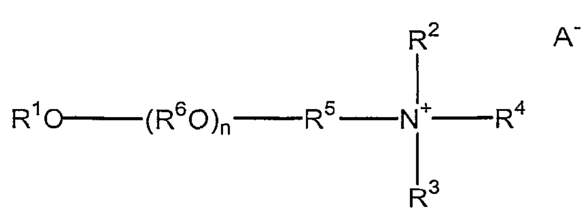
or



(8)

wherein R^1 is linear or branched alkyl or aryl having from about 4 to about 16 carbon atoms, R^2 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_xH$, R^3 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_yH$ wherein the sum of x and y is not more than about 5; R^4 is hydrogen or methyl; R^6 in each of the n (R^6O) groups is independently C_2-C_4 alkylene; R^5 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; and A- is an agriculturally acceptable anion. Non-limiting examples include, mixed C_{8-16} alkyl amine (Armeen C), dimethylcocoamine (Arquad DMCD), cocoammonium chloride (Arquad C), PEG 2 cocoamine (Ethomeen C12), and PEG 5 cocoamine (Ethomeen C15), all of which are manufactured by Akzo Nobel, hexylamine, dimethylhexylamine, octylamine, dimethyloctylamine, dodecyltrimethyl amide and C_{4-8} trialkyl amines. The most preferred stabilizer is octylamine.

In high load glyphosate formulations it is preferred to add the stabilizers in a weight ratio of surfactant:stabilizer between about 1:2 and about 100:1, and more preferably between about 1:1 and about 8:1. A particularly preferred range is between about 1.5:1 and about 6:1.

The substantially water-immiscible organic solvent of the invention is any solvent which has a solubility in water of less than about 10% w/w, and has a specific gravity between about 0.7 and about 1.2. The solvents aid in the formation of a microemulsion, and increase the dispersability of hydrophobic surfactants or surfactants with a hydrophobic moiety in the aqueous carrier phase. Preferred hydrophobic solvents have a solubility in water of less than about 7% w/w, more preferably less than about 5% w/w, and most preferably less than about 1% w/w. These solvents additionally have a specific gravity between about 0.7 and 1.2, more preferably between about 0.7 and 1.15, and most preferably between about 0.7 and 1.1. Non-limiting examples of preferred hydrophobic solvents include toluene, xylene, cyclohexane, dichloromethane, dichlorobenzene, perchloroethylene, petroleum naphthas, mineral oil, fuel oil, vegetable oil and kerosine. Preferred hydrophobic solvents include toluene, xylenes, petroleum naphthas and oils. Commercially available preferred

solvents include Aromatic 150 (from Exxon) and Isopar L (from Exxon). Preferred solvents include aliphatic hydrocarbons, halogenated alkyls, aryl hydrocarbons, or mixtures thereof. Examples of commercially available organic solvents include Aromatic 150 (from Exxon) and Isopar L (from Exxon).

Compositions of the invention can optionally contain one or more water-insoluble herbicides in solution in the solvent or in suspension in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant. Preferred water-insoluble herbicide is selected from the group consisting of acetochlor, aclonifen, alachlor, ametryn, amidosulfuron, anilofos, atrazine, azafenidin, azimsulfuron, benfluralin, benfuresate, bensulfuron-methyl, bensulide, benzfendizone, benzofenap, bromobutide, bromofenoxim, butachlor, butafenacil, butamifos, butralin, butroxydim, butylate, cafenstrole, carfentrazone-ethyl, carbetamide, chlorbromuron, chloridazon, chlorimuron-ethyl, chlorotoluron, chlornitrofen, chlorotoluron, chlorpropham, chlorsulfuron, chlorthal-dimethyl, chlorthiamid, cinidon-ethyl, cinmethylin, cinosulfuron, clethodim, clodinafop-propargyl, clomazone, clomeprop, cloransulam-methyl, cyanazine, cycloate, cyclosulfamuron, cycloxydim, cyhalofop-butyl, daimuron, desmedipham, desmetryn, dichlobenil, diclofop-methyl, diflufenican, dimefuron, dimepiperate, dimethachlor, dimethametryn, dimethenamid, dinitramine, dinoterb, diphenamid, dithiopyr, diuron, EPTC, esprocarb, ethalfluralin, ethametsulfuron-methyl, ethofumesate, ethoxysulfuron, etobenzanid, fenoxaprop-ethyl, fenuron, flamprop-methyl, flazasulfuron, fluazifop-butyl, fluazifop-P-butyl, fluazoate, fluchloralin, flumetsulam, flumiclorac-pentyl, flumioxazin, fluometuron, fluorochloridone, flupoxam, flurenol, fluridone, fluroxypyr-1-methylheptyl, flurtamone, fluthiacet-methyl, graminicides, halosulfuron, haloxyfop, hexazinone, imazosulfuron, indanofan, isoproturon, isouron, isoxaben, isoxaflutole, isoxapyrifop, lenacil, linuron, mefenacet, metamitron, metazachlor, methabenzthiazuron, methyldymron, metobenzuron, metobromuron, metolachlor, S-metolachlor, metosulam, metoxuron, metribuzin, metsulfuron,

molinate, monolinuron, naproanilide, napropamide, neburon, nicosulfuron, norflurazon, orbencarb, oryzalin, oxadiargyl, oxadiazon, oxasulfuron, pebulate, pendimethalin, pentanochlor, pentoxazone, phenmedipham, piperophos, pretilachlor, primisulfuron, prodiamine, profluazol, prometon, prometryn, propachlor, propanil, propaquizafop, propazine, propham, propisochlor, propyzamide, prosulfocarb, prosulfuron, pyraflufen-ethyl, pyrazogyl, pyrazolynate, pyrazosulfuron-ethyl, pyrazoxyfen, pyributicarb, pyridate, pyriminobac-methyl, quinclorac, quinmerac, quizalofop, quizalofop-P, rimsulfuron, sethoxydim, siduron, simazine, simetryn, sulcotrione, sulfentrazone, sulfometuron, sulfosulfuron, tebutam, tebuthiuron, tepraloxydim, terbacil, terbumeton, terbuthylazine, terbutryn, thenylchlor, thiazopyr, thidiazimin, thifensulfuron, thiobencarb, tiocarbazil, tralkoxydim, triallate, triasulfuron, tribenuron, trietazine, trifluralin, triflusulfuron and vernolate.

Preferred cationic and nonionic surfactants effective in formulating herbicidal compositions and concentrates of the invention, particularly in formulating compositions and concentrates containing potassium, ammonium or diammonium glyphosate, are listed below.

Cationic surfactants effective in forming herbicide formulations include:

(a) aminated alkoxylated alcohol having the formula:

$$R^1O\text{---}(R^2O)_X\text{---}R^3\text{---}N\begin{matrix} \diagup R^4 \\ \diagdown R^5 \end{matrix} \qquad (9)$$

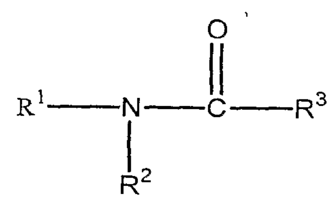
or

$$R^1O\text{---}(R^2O)_X\text{---}R^3\text{---}\overset{\displaystyle R^4}{\underset{\displaystyle R^5}{\overset{|}{\underset{|}{N^+}}}}\text{---}R^{14} \quad A^- \qquad (10)$$

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 and R^6 are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-(R^6)_n-C(O)OR^7$, $-C(=S)NR^{12}R^{13}$ or together with R^5 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^5 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-(R^6)_n-C(O)OR^7$, $-C(=S)NR^{12}R^{13}$, or together with R^4 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted hydrocarbyl, R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, or $-C(=S)NR^{12}R^{13}$, n is 0 or 1, x and y are independently an average number from 1 to about 60, and A- is an agriculturally acceptable anion. In this context, preferred R^1, R^3, R^4, R^5, R^6, R^{11}, R^{12} and R^{13} hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. In one embodiment, R^3 is linear alkylene, preferably ethylene, and R^1, R^2, R^4 and R^5 are as previously defined. In another embodiment, R^4 is H, alkyl, or $-R^2OR^7$ and R^1, R^2, R^3, R^5 and R^7 are as previously defined. In yet another embodiment, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 25 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is a linear or branched alkylene group having from 1 to about 6 carbon atoms, R^4 and R^5 are each independently hydrogen or a linear or branched alkyl group having from 1 to about 6 carbon atoms, and x is an average number from 1 to about 30. More preferably, R^1 is a linear or branched alkyl group having from about 12 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is a

linear or branched alkylene group having from 1 to about 4 carbon atoms, R^4 and R^5 are each independently hydrogen, methyl, or tris(hydroxymethyl)methyl, and x is an average number from about 2 to about 30. Even more preferably, R^1 is a linear or branched alkyl group having from about 12 to about 18 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is an ethylene or a 2-hydroxypropylene group, R^4 and R^5 are each independently hydrogen or methyl, and x is an average number from about 4 to about 20. Most preferably, R^1 is a linear or branched alkyl group having from about 12 to about 18 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is an ethylene or a 2-hydroxypropylene group, R^4 and R^5 are methyl, and x is an average number from about 4 to about 20. Compounds of formula (2) have the preferred groups as described above and R^{14} is preferably hydrogen or a linear or branched alkyl or alkenyl group, more preferably alkyl, and most preferably methyl. Preferred monoalkoxylated amines include PEG 13 or 18 C_{14-15} ether propylamines and PEG 7, 10, 15 or 20 C_{16-18} ether propylamines (from Tomah) and PEG 13 or 18 C_{14-15} ether dimethyl propylamines and PEG 10, 15 or 20 or 25 C_{16-18} ether dimethyl propylamines (from Tomah).

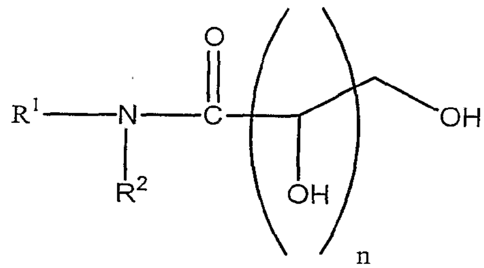
(b) hydroxylated amides having the formula:



(11)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl. In this context, preferred R^1 and R^2 hydrocarbyl groups are

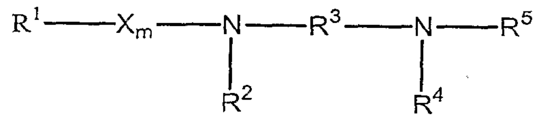
linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, the hydroxylated amides have the formula:



(12)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and n is 1 to about 8. In this context, preferred R^1 and R^2 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 30 carbon atoms, R^2 is hydrogen, a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms, and n is about 4 to about 8; or R^1 and R^2 are independently linear or branched alkyl or linear or branched alkenyl groups having from about 4 to about 30 carbon atoms and n is about 4 to about 8. More preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 22 carbon atoms, R^2 is hydrogen or a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 6 carbon atoms, and n is about 4 to about 8; or R^1 and R^2 are independently linear or branched alkyl or linear or branched alkenyl groups having from about 4 to about 8 carbon atoms, and n is about 4 to about 8.

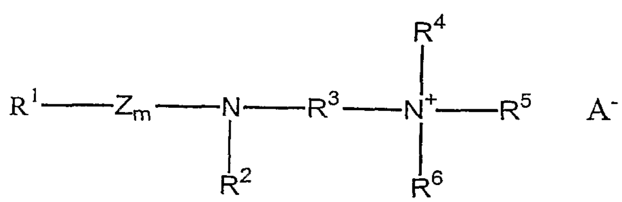
(c) diamines having the formula:



(13)

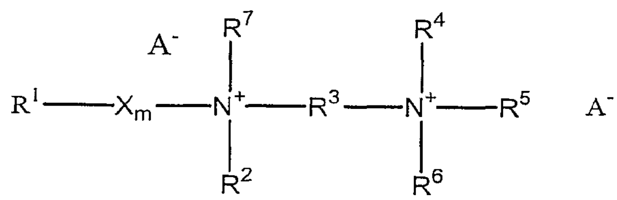
wherein R^1, R^2 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^4 and R^{10} are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, and X is -C(O)- or $-SO_2-$. In this context, preferred R^1, R^2, R^3, R^4, R^5 and R^{10} hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1, R^2, R^4 and R^5 are independently hydrogen, a linear or branched alkyl or alkenyl group having from 1 to about 6 carbon atoms, and R^3 is a linear or branched alkylene having from 2 to about 6 carbon atoms. More preferably, R^1, R^2, R^4 and R^5 are independently hydrogen, or a linear or branched alkyl group having from 1 to about 6 carbon atoms, and R^3 is a linear or branched alkylene having from 2 to about 6 carbon atoms. Most preferably, R^1, R^2, R^4, and R^5 are independently hydrogen or methyl, and R^3 is ethylene or propylene.

(d) mono- or di-ammonium salts having the formula:



(14)

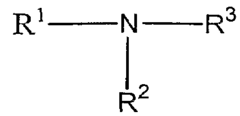
or



(15)

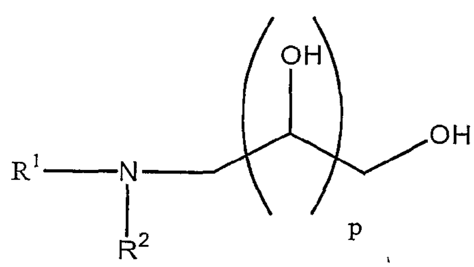
wherein R^1, R^2, R^4, R^5 and R^7 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^6 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^{10} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, X is -C(O)- or $-SO_2-$, Z is -C(O)-, and A^- is an agriculturally acceptable anion. In this context, preferred R^1-R^{10} hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1, R^2, R^4, R^5 and R^7 are independently hydrogen, or a linear or branched alkyl or alkenyl group having from 1 to about 6 carbon atoms, R^6 is a linear or branched alkyl or alkenyl group having from about 8 to about 30 carbon atoms, m is 0 or 1, and R^3 is a linear or branched alkylene having from 2 to about 22 carbon atoms. More preferably, R^1, R^2, R^4, R^5 and R^7 are independently hydrogen, or a linear or branched alkyl group having from 1 to about 6 carbon atoms, R^6 is a linear or branched alkyl group having from about 8 to about 22 carbon atoms, m is 0 or 1, and R^3 is a linear or branched alkylene having from 2 to about 20 carbon atoms. Most preferably, R^1, R^2, R^4, R^5 and R^7 are independently hydrogen or methyl, R^6 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms, m is 0 or 1, and R^3 is ethylene or propylene.

(e) poly(hydroxyalkyl)amines having the formula:



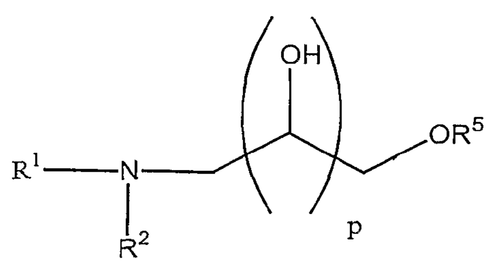
(16)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-R^4OR^5$, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms. Preferably, the poly(hydroxyalkyl)amines have the formula:

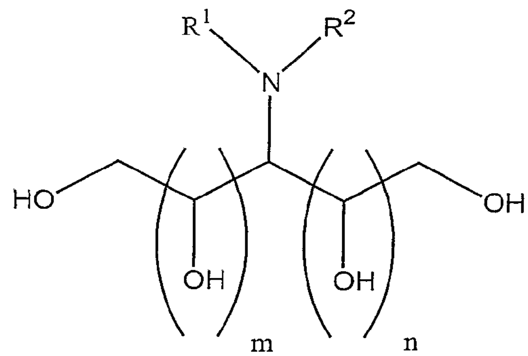


(17)

or



or (17A)



(18)

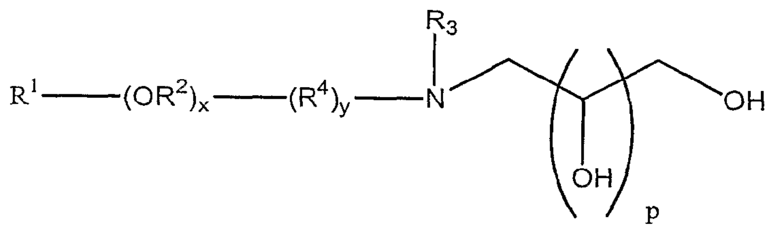
wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-R^3OR^4$; R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, R^4 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^5 is $-(R^6O)_yR^7$;R^6 in each of the $y(R^6O)$ groups is independently C_2-C_4 alkylene; R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; y is an average number from 0 to about 30, m and n are independently integers from 0 to about 7, the sum of m and n is not greater than about 7, and p is an integer from 1 to about 8. In this context, preferred R^1, R^2, R^3, and R^4 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 30 carbon atoms or $-R^3OR^4$, R^2 is hydrogen, a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms, R^3 is a linear or branched alkylene or alkenylene group having from 2 to about 6 carbon atoms, R^4 is a linear or branched alkyl or alkenyl group having from about 8 to about 22 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, and p is an integer from about 4 to about 8; or R^1 and R^2 are independently linear or branched alkyl or linear or branched alkenyl groups having from about 4 to about 30 carbon

atoms, m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, and p is an integer from about 4 to about 8. More preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 22 carbon atoms or $-R^3OR^4$, R^2 is hydrogen or a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 6 carbon atoms, R^3 is a linear or branched alkylene or alkenylene group having from 2 to about 6 carbon atoms, R^4 is a linear or branched alkyl or alkenyl group having from about 8 to about 18 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, and p is an integer from about 4 to about 8; or R^1 and R^2 are independently linear or branched alkyl or linear or branched alkenyl groups having from about 4 to about 8 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, and p is an integer from about 4 to about 8. Even more preferably, R^1 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms or $-R^3OR^4$, R^2 is hydrogen or methyl, m and n are independently integers from 0 to about 4, R^3 is a linear or branched alkylene group having from 2 to about 6 carbon atoms, R^4 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms, the sum of m and n is about 4, and p is an integer of about 4. Most preferably, R^1 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms or $-R^3OR^4$, R^2 is methyl, R^3 is ethylene, propylene, hydroxyethylene or 2-hydroxypropylene, R^4 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms, m and n are independently integers from 0 to about 4, the sum of m and n is about 4, and p is an integer of about 4. Such compounds are commercially available from Aldrich and Clariant.

(f) alkoxylated poly(hydroxyalkyl)amines having the formula:

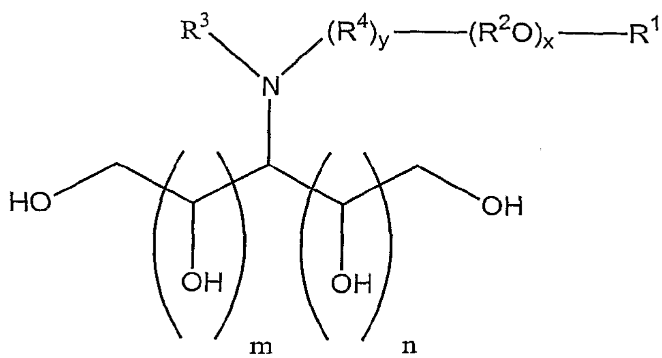
$$R^1 — (OR^2)_x — (R^4)_y — \underset{}{\overset{\displaystyle R^3 \atop |}{N}} — R^5 \qquad (19)$$

wherein R^1 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene; R^4 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 30 carbon atoms, R^5 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl; x is an average number from 0 to about 30, and y is 0 or 1. In this context, preferred R^1, R^3, and R^4 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) group. Preferred alkoxylated poly(hydroxyalkyl)amines have the formula:



(20)

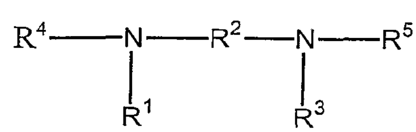
or



(21)

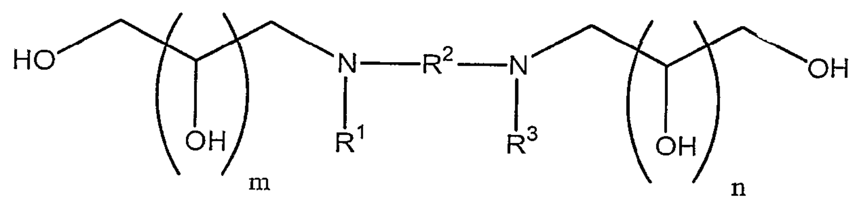
wherein R^1 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene; R^4 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 30 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is not greater than about 7, p is an integer from 1 to about 8, x is an average number from 0

to about 30, and y is 0 or 1. In this context, preferred R^1, R^3, and R^4 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) group. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 30 carbon atoms; R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene; R^3 is hydrogen, a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms; R^4 is a linear or branched alkylene having from 1 to about 30 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, p is an integer from 1 to about 8, x is an average number from 0 to about 30, and y is 0 or 1. More preferably, R^1 is a linear or branched alkyl group having from about 8 to about 22 carbon atoms; R^2 in each of the x (R^2O) groups is independently ethylene or propylene; R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 6 carbon atoms; R^4 is a linear or branched alkylene having from 1 to about 6 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, p is an integer from 1 to about 8, x is an average number from 0 to about 30, and y is 0 or 1. Most preferably, R^1 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms; R^2 in each of the x (R^2O) groups is independently ethylene or propylene; R^3 is hydrogen or methyl; m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, p is an integer from 1 to about 8, x is an average number from 0 to about 30, and y is 0. (g) di-poly(hydroxyalkyl)amine having the formula:



(22)

wherein R^1 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 22 carbon atoms, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^4 and R^5 are independently hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl. In this context, preferred R^1, R^2, and R^3 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, the di-poly(hydroxyalkyl)amine has the formula:

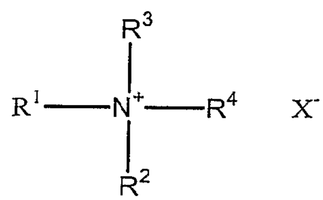


(23)

wherein R^1 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 22 carbon atoms, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and m and n are independently integers from 1 to about 8. In this context, preferred R^1, R^2, and R^3 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1 and R^3 are independently hydrogen or a linear or branched alkyl group having from 1 to about 18 carbon atoms, R^2 is a linear or branched alkylene or linear or branched alkenylene group having from 2 to about 18 carbon atoms, and m and n are independently integers from 1 to about 8. More preferably, R^1 and R^3 are independently hydrogen or a linear or branched alkyl group having from 6 to about 12 carbon atoms, R^2 is a linear or branched alkylene group having from 2 to about 6 carbon atoms, and m and n are independently integers from about 4 to about 8; or R^1 and R^3 are independently hydrogen or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^2 is a linear or

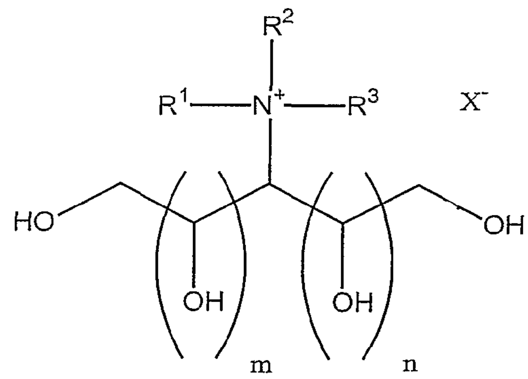
branched alkylene group having from 2 to about 16 carbon atoms, and m and n are independently integers from about 4 to about 8. Most preferably, R^1 and R^3 are independently hydrogen or a linear or branched alkyl group having from 6 to about 12 carbon atoms, R^2 is ethylene or propylene, and m and n are independently integers from about 4 to about 8; or R^1 and R^3 are independently hydrogen or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^2 is a linear or branched alkylene group having from 2 to about 12 carbon atoms, and m and n are independently integers from about 4 to about 8.

(h) quaternary poly(hydroxyalkyl)amine salts having the formula:



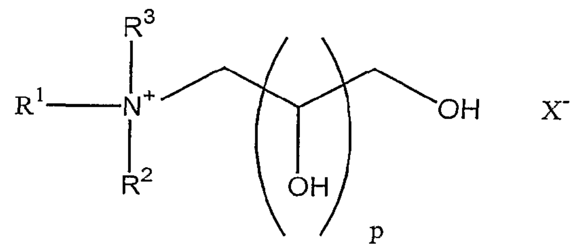
(24)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-X_m-(R^4O)_yR^5$, R^2 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, X- is an agriculturally acceptable anion; R^4 in each of the $y(R^4O)$ groups is independently C_2-C_4 alkylene; R^5 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; X is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms; m is 0 or 1; and y is an average number from 0 to about 30. In this context, preferred R^1, R^2, and R^3 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, the quaternary poly(hydroxyalkyl) amine salts have the formula:



(25)

or

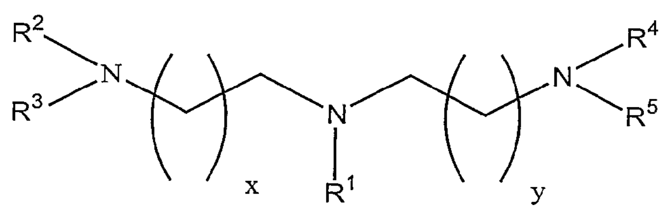


(26)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms, R^2 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is not greater than about 7, p is an integer from 1 to about 8, and X- is an agriculturally acceptable anion. In this context, preferred R^1, R^2, and R^3 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 30 carbon atoms, R^2 and R^3 are independently hydrogen or a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is

from about 3 to 7, and p is an integer from about 4 to about 8; or R^1, R^2 and R^3 are independently linear or branched alkyl or linear or branched alkenyl groups having from about 4 to about 30 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is not greater than about 7, and p is an integer from about 4 to about 8. More preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 22 carbon atoms, R^2 and R^3 are independently hydrogen or a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 6 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, and p is an integer from about 4 to about 8; or R^1, R^2 and R^3 are independently linear or branched alkyl or linear or branched alkenyl groups having from about 4 to about 8 carbon atoms, m and n are independently integers from 0 to about 7, the sum of m and n is from about 3 to 7, and p is an integer from about 4 to about 8. Even more preferably, R^1 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms, R^2 and R^3 are independently hydrogen or methyl, m and n are independently integers from 0 to about 4, the sum of m and n is about 4, and p is an integer of about 4. Most preferably, R^1 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms, R^2 and R^3 are methyl, m and n are independently integers from 0 to about 4, the sum of m and n is about 4, and p is an integer of about 4.

(i) triamines having the formula:



(27)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^8)_s(R^7O)_nR^6$; R^6 is hydrogen or a linear or branched alkyl group having from 1 to about 4 carbon

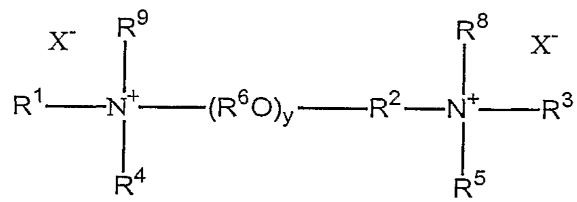
atoms, R^7 in each of the n (R^7O) groups is independently C_2-C_4 alkylene; R^8 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, n is an average number from 1 to about 10, s is 0 or 1, and x and y are independently an integer from 1 to about 4. In this context, preferred R^1, R^2, R^3, R^4, R^5, and R^8 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl groups having from about 8 to about 30 carbon atoms, R^2, R^3, R^4 and R^5 are independently hydrogen, a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms, or $-(R^7O)_nR^6$, R^6 is hydrogen, methyl or ethyl; R^7 in each of the n (R^7O) groups is independently C_2-C_4 alkylene, n is an average number from 1 to about 10, and x and y are independently an integer from 1 to about 4. More preferably, R^1 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms, R^2, R^3, R^4 and R^5 are independently hydrogen, a linear or branched alkyl group having from 1 to about 6 carbon atoms, or $-(R^7O)_nR^6$, R^6 is hydrogen or methyl, R^7 in each of the n (R^7O) groups is independently ethylene or propylene, n is an average number from 1 to about 5, and x and y are independently an integer from 1 to about 4. Most preferably, R^1 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms, R^2, R^3, R^4 and R^5 are independently hydrogen, or $-(R^7O)_nR^6$, R^6 is hydrogen, R^7 in each of the n (R^7O) groups is independently ethylene or propylene, n is an average number from 1 to about 5, and x and y are independently an integer from 1 to about 4. Commercially available triamines include Acros and Clariant Genamin 3119.

(j) diamines having the formula:

$$\begin{array}{ccccccccc} R^1 & — & N & — & (R^6O)_y & — & R^2 & — & N & — & R^3 \\ & & | & & & & & & | & & \\ & & R^4 & & & & & & R^5 & & \end{array} \qquad (28)$$

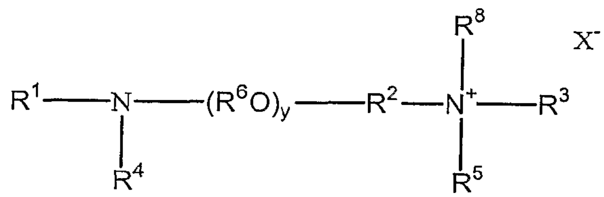
wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $C(=NR^{11})NR^{12}R^{13}$-, $-C(=O)NR^{12}R^{13}$-, $-C(=S)NR^{12}R^{13}$-, $-C(=NR^{12})$-, -C(S)-, or -C(O)-, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x is an average number from 1 to about 50, and y is an average number from 0 to about 60. In this context, preferred R^1, R^2, R^3, R^4, and R^5 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1, R^3, R^4 and R^5 are independently hydrogen or a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 22 carbon atoms or $-(R^6O)_xR^7$, R^2 is a linear or branched alkylene or linear or branched alkenylene group having from 1 to about 6 carbon atoms, R^6 in each of the x(R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 30, and y is an average number from 0 to about 60. More preferably, R^1, R^3, R^4 and R^5 are independently hydrogen or a linear or branched alkyl group having from about 1 to about 18 carbon atoms or $-(R^6O)_xR^7$, R^2 is a linear or branched alkylene group having from about 1 to about 6 carbon atoms, R^6 in each of the x (R^6 O) and y (R^6O) groups is independently ethylene or propylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 15, and y is an average number from 0 to about 60. Most preferably, R^1 and R^3 are independently linear or branched alkyl groups having from about 8 to about 18 carbon atoms and R^4 and R^5 are independently hydrogen, R^2 is a linear or branched alkylene group having from about 1 to about 6 carbon atoms, R^6 in each of the x (R^6 O) and y (R^6O) groups is independently ethylene or propylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 10, and y is an average number from 0 to about 50.

(k) mono- or di-quaternary ammonium salts having the formula:



(29)

or

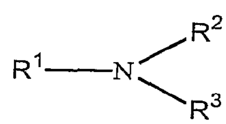


(30)

wherein R^1, R^3, R^4, R^5, R^8 and R^9 are independently hydrogen, polyhydroxyalkyl, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 30, y is an average number from about 3 to about 60, and X^- is an agriculturally acceptable anion. In this context, preferred R^1, R^2, R^3, R^4, R^5, R^8 and R^9 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1, R^3, R^4, R^5, R^8 and R^9 are independently hydrogen or a linear or branched alkyl or alkenyl group having from about 1 to about 22 carbon atoms or $-(R^6O)_xR^7$, R^2 is a linear or branched alkylene or alkenylene group having from about 1 to about 6 carbon atoms, R^6 in each of the x(R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 30, and y is an average number from 1 to about 60. More preferably, R^1, R^3, R^4, R^5, R^8

and R^9 are independently hydrogen or a linear or branched alkyl group having from about 1 to about 18 carbon atoms or $-(R^6O)_xR^7$, R^2 is a linear or branched alkylene group having from about 1 to about 6 carbon atoms, R^6 in each of the x (R^6 O) and y (R^6O) groups is independently ethylene or propylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 10, and y is an average number from 1 to about 60. Most preferably, R^1 and R^3 are independently linear or branched alkyl groups having from about 8 to about 18 carbon atoms and R^4, R^5, R^8 and R^9 are independently hydrogen or methyl, R^2 is a linear or branched alkylene group having from about 1 to about 6 carbon atoms, R^6 in each of the x (R^6 O) and y (R^6O) groups is independently ethylene or propylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 10, and y is an average number from 10 to about 50.

(l) a secondary or tertiary amine having the formula:



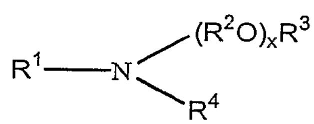
(31)

wherein R^1 and R^2 are hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms. In this context, preferred R^1, R^2, and R^3 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 30 carbon atoms, and R^2 and R^3 are independently hydrogen or a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 6 carbon atoms. More preferably, R^1 is a linear or branched alkyl group having from about 12 to about 22 carbon atoms, and R^2 and R^3 are independently hydrogen, methyl or ethyl. In one embodiment of the amine of formula (27), R^1 is a linear or branched alkyl group having from about 12 to about 22 carbon atoms, and R^2 and R^3

are independently linear or branched hydroxyalkyl groups having from 1 to about 6 carbon atoms.

In one embodiment, the surfactant has the formula (31) wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 8 to about 30 carbon atoms, R^2 is a hydroxyalkyl, polyhydroxyalkyl or poly(hydroxyalkyl)alkyl group, and R^3 is hydrogen, hydroxyalkyl, polyhydroxyalkyl or poly(hydroxyalkyl)alkyl. In this context, preferred R^1 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. In one embodiment, R^1 is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 8 to about 30 carbon atoms, R^2 is a linear or branched hydroxyalkyl group having from 1 to about 6 carbon atoms, and R^3 is hydrogen or a linear or branched hydroxyalkyl group having from 1 to about 6 carbon atoms. Preferably, R^1 is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 8 to about 22 carbon atoms, R^2 is a linear or branched hydroxyalkyl group having from 1 to about 4 carbon atoms, and R^3 is hydrogen or a linear or branched hydroxyalkyl group having from 1 to about 4 carbon atoms. More preferably, R^1 is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from about 8 to about 18 carbon atoms, R^2 is hydroxymethyl or hydroxyethyl, and R^3 is hydrogen, hydroxymethyl or hydroxyethyl.

(m) monoalkylated amines having the formula:

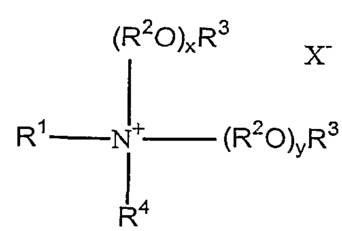


(32)

wherein R^1 and R^4 are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or $-R^5SR^6$, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^5 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^6 is a hydrocarbyl or substituted

hydrocarbyl group having from 4 to about 15 carbon atoms and x is an average number from 1 to about 60. In this context, preferred R^1, R^4, and R^6 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. In one embodiment, R^1 includes from about 7 to about 30 carbon atoms, preferably from about 8 to about 22 carbon atoms, and the remaining groups are as described above. Preferably, R^1 and R^4 are independently a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 25 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, methyl or ethyl, and x is an average number from 1 to about 40. More preferably, R^1 and R^4 are independently a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from 1 to about 30. Even more preferably, R^1 is a linear or branched alkyl group having from about 8 to about 22 carbon atoms and R^4 is a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from about 1 to about 10. Most preferably, R^1 is a linear or branched alkyl group having from about 16 to about 22 carbon atoms and R^4 is methyl, R^2 in each of the x (R^2O) groups is ethylene, R^3 is hydrogen, and x is an average number from about 1 to about 5, or R^1 is a linear or branched alkyl group having from about 8 to about 15 carbon atoms and R^4 is methyl, R^2 in each of the x (R^2O) groups is ethylene, R^3 is hydrogen, and x is an average number from about 5 to about 10.

(n) dialkoxylated quaternary ammonium salts having the formula:

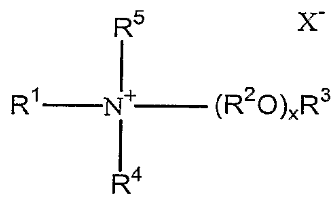


(33)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^4 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x and y are independently an average number from 1 to about 40, and X- is an agriculturally acceptable anion. In this context, preferred R^1 and R^4 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, R^1 and R^4 are independently a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 25 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, methyl or ethyl, and the sum of x and y is an average number from about 2 to about 30. More preferably, R^1 and R^4 are independently a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and the sum of x any y is an average number from about 2 to about 20. Even more preferably, R^1 is a linear or branched alkyl group having from about 8 to about 22 carbon atoms and R^4 is a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from about 2 to about 20. Most preferably, R^1 is a linear or branched alkyl group having from about 8 to about 22 carbon atoms and R^4 is a linear or branched alkyl group having from 1 to about 6 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from about 2 to about 15, or R^1 and R^4 are independently a linear or branched alkyl group having from about 8 to about 22 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from about 5 to about 15. Preferred dialkoxylated quaternary ammonium surfactants include Ethoquad™ C12 (a PEG 2 coco methyl ammonium chloride from Akzo Nobel), Ethoquad™ C15 (a PEG 5 tallow ammonium chloride from Akzo Nobel), Ethoquad™ T25 (a PEG 15 tallow methyl ammonium chloride from Akzo Nobel),

PEG 5 coco methyl ammonium chloride, PEG 5 tallow methyl ammonium chloride, PEG 5 ditallow ammonium bromide, PEG 10 ditallow ammonium bromide, di-dodecyl diEO 10 ammonium bromide, di-coco di EO (15) ammonium chloride, di-dodecyl di EO (15) ammonium chloride, di-dodecyl di EO (10) ammonium bromide, dialkyl (tallow and stearyl) di EO (19.6) ammonium bromide, polypropylene glycol-40 diethyl ammonium chloride (Emcol CC-42 from CK Witco), polypropylene glycol-55 diethyl ammonium chloride (Emcol CC-55 from CK Witco) and tallow methyl EO (8) ammonium chloride.

(o) monoalkoxylated quaternary ammonium salts having the formula:

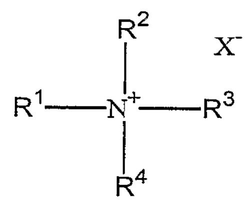


(34)

wherein R^1 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X- is an agriculturally acceptable anion. In this context, preferred R^1, R^4, and R^5 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, R^1, R^4 and R^5 are independently a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 25 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, methyl or ethyl, and x is an average number from 1 to about 40. More preferably, R^1, R^4 and R^5 are independently a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from 1 to about 30. Even more preferably, R^1 is a linear

or branched alkyl group having from about 8 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, R^4 and R^5 are independently a linear or branched alkyl group having from 1 to about 22 carbon atoms, and x is an average number from 1 to about 30. Even more preferably, R^1 is a linear or branched alkyl group having from about 8 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, R^4 and R^5 are independently a linear or branched alkyl group having from 1 to about 6 carbon atoms, and x is an average number from about 5 to about 25. Most preferably, R^1 is a linear or branched alkyl group having from about 16 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, R^4 and R^5 are independently a linear or branched alkyl group having from 1 to about 3 carbon atoms, and x is an average number from about 5 to about 25. Preferred monoalkoxylated quaternary ammonium surfactants include PEG 7 C_{18} dimethyl ammonium chloride and PEG 22 C_{18} dimethyl ammonium chloride.

(p) quaternary ammonium salts having the formula:

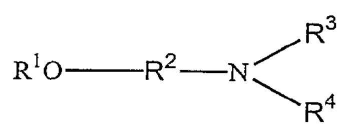


(35)

wherein R^1, R^3 and R^4 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and X- is an agriculturally acceptable anion. In this context, preferred R^1, R^2, R^3, and R^4 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 30 carbon atoms, and R^2, R^3 and R^4 are independently a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms. More preferably, R^1 is a linear or

branched alkyl or linear or branched alkenyl group having from about 8 to about 22 carbon atoms, and R^2, R^3 and R^4 are independently a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 6 carbon atoms. Even more preferably, R^1 is a linear or branched alkyl group having from about 8 to about 16 carbon atoms, and R^2, R^3 and R^4 are independently a linear or branched alkyl group having from 1 to about 6 carbon atoms. Most preferably, R^1 is a linear or branched alkyl group having from about 8 to about 14 carbon atoms, and R^2, R^3 and R^4 are methyl. Preferred commercially available quaternary ammonium surfactants include Arquad™ C-50 (a dodecyl trimethyl ammonium chloride from Akzo Nobel) and Arquad™ T-50 (a tallow trimethyl ammonium chloride from Akzo Nobel).

(q) etheramines having the formula:



(36)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^3 and R^4 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^5O)_xR^6$, R^5 in each of the $x(R^5\text{-}O)$ groups is independently C_2-C_4 alkylene, R^6 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 50. In this context, preferred R^1, R^2, R^3, and R^4 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1 is a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from 8 to about 25 carbon atoms, R^2 is a linear or branched alkylene or alkenylene group having from 2 to about 30 carbon atoms, R^3 and R^4 are independently hydrogen, a linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl group having from 1 to about 30 carbon atoms, or $-(R^5O)_xR^6$, R^5 in each of the

x (R^5 O) groups is independently C_2-C_4 alkylene, R^6 is hydrogen, methyl or ethyl, and x is an average number from 1 to about 30. More preferably, R^1 is a linear or branched alkyl or alkenyl group having from 8 to about 22 carbon atoms, R^2 is a linear or branched alkylene or alkenylene group having from 2 to about 6 carbon atoms, R^3 and R^4 are independently hydrogen, a linear or branched alkyl or alkenyl group having from 1 to about 6 carbon atoms, or $-(R^5O)_xR^6$, R^5 in each of the x (R^5 O) groups is independently ethylene or propylene, R^6 is hydrogen or methyl, and x is an average number from 1 to about 15. Most preferably, R^1 is a linear or branched alkyl or alkenyl group having from 8 to about 18 carbon atoms, R^2 is ethylene or propylene, R^3 and R^4 are independently hydrogen, methyl, or $-(R^5O)_xR^6$, R^5 in each of the x (R^5 O) groups is independently ethylene or propylene, R^6 is hydrogen, and x is an average number from 1 to about 5.

(r) diamines having the formula:

$$\begin{array}{ccccccccccccc} R^1 & — & (X)_z & — & (R^8)_n & — & N & — & (R^6O)_y & — & R^2 & — & N & — & R^3 \\ & & & & & & | & & & & & & | & & \\ & & & & & & R^4 & & & & & & R^5 & & \end{array}$$

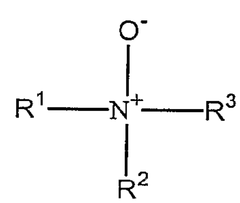
(37)

wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$; R^2 and R^8 are independently hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 30, X is -O-, $-N(R^6)-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^9)C(O)-$, $-C(O)N(R^9)-$, -S-, -SO-, or $-SO_2-$, y is 0 or an average number from 1 to about 30, n and z are independently 0 or 1, and R^9 is hydrogen or hydrocarbyl or substituted hydrocarbyl. In this context, preferred R^1, R^2, R^3, R^4, R^5 and R^9 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1 and R^4 are

independently a linear or branched alkyl or linear or branched alkenyl group having from about 1 to about 22 carbon atoms, R^2 and R^8 are independently linear or branched alkylene groups having from about 2 to about 25 carbon atoms, R^3 and R^5 are each independently hydrogen or a linear or branched alkyl group having from 1 to about 6 carbon atoms and n, y and z are 0; or R^1, R^2, R^3 and R^4 are independently hydrogen or a linear or branched alkyl or alkenyl group having from about 1 to about 6 carbon atoms, R^2 is a linear or branched alkylene or alkenylene group having from about 8 to about 25 carbon atoms, and n, y and z are 0; or R^1, R^2, R^3 and R^4 are independently hydrogen or a linear or branched alkyl or alkenyl group having from about 1 to about 6 carbon atoms, R^2 is a linear or branched alkylene or alkenylene group having from about 1 to about 6 carbon atoms, R^6 in each of the y (R^6O) groups is independently C_2-C_4 alkylene, y is an average number from 1 to about 20 and n and z are 0; or R^1 and R^3 are independently a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 22 carbon atoms, R^2 is a linear or branched alkylene group having from about 2 to about 25 carbon atoms; and R^4 and R^5 are each independently hydrogen, a linear or branched alkyl or alkenyl group having from 1 to about 6 carbon atoms, or $-(R^6O)_xR^7$, R^6 in each of the x (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 30, and n, y and z are 0; or R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 1 to about 22 carbon atoms, R^2 is a linear or branched alkylene group having from about 2 to about 25 carbon atoms, R^3, R^4 and R^5 are each independently hydrogen or a linear or branched alkyl group having from 1 to about 6 carbon atoms, X is -C(O)- or $-SO_2-$, n and y are 0 and z is 1. More preferably, R^1 and R^4 are independently a linear or branched alkyl or linear or branched alkenyl group having from about 4 to about 18 carbon atoms, R^2 is a linear or branched alkylene group having from about 2 to about 6 carbon atoms, R^3 and R^5 are each independently hydrogen or a linear or branched alkyl group having from 1 to about 6 carbon atoms, and n, y and z are 0; or R^1, R^2, R^3 and R^4 are independently hydrogen or a linear or branched alkyl group having from about 1 to about 6 carbon atoms, R^2 is a linear or branched alkylene group having from about 8 to about 25

carbon atoms, and y is 0; or R^1, R^2, R^3 and R^4 are independently hydrogen or a linear or branched alkyl group having from about 1 to about 6 carbon atoms, R^2 is a linear or branched alkylene group having from about 1 to about 6 carbon atoms, R^6 in each of the y (R^6O) groups is independently ethylene or propylene, y is an average number from 1 to about 10 and n and z is 0; or R^1 and R^3 are independently a linear or branched alkyl group having from about 8 to about 22 carbon atoms, R^2 is a linear or branched alkylene group having from about 2 to about 6 carbon atoms, and R^4 and R^5 are each independently hydrogen, a linear or branched alkyl group having from 1 to about 6 carbon atoms, or $-(R^6O)_xR^7$, R^6 in each of the x (R^6O) groups is independently ethylene or propylene, R^7 is hydrogen or methyl, x is an average number from 1 to about 15, and n, y and z are 0; or R^1 is a linear or branched alkyl group having from about 1 to about 22 carbon atoms, R^2 is a linear or branched alkylene group having from about 2 to about 6 carbon atoms, R^3, R^4 and R^5 are each independently hydrogen, X is -C(O)- or $-SO_2-$, n and y are 0 and z is 1. Preferred diamines include Gemini 14-2-14, Gemini 14-3-14, Gemini 10-2-10, Gemini 10-3-10, Gemini 10-4-10, and Gemini 16-2-16 (C_{10}, C_{14} or C_{16} ethylene, propylene or butylene N-methyl diamines from Monsanto), Ethoduomeens™, and Jeffamine™ EDR-148.

(s) amine oxides having the formula:

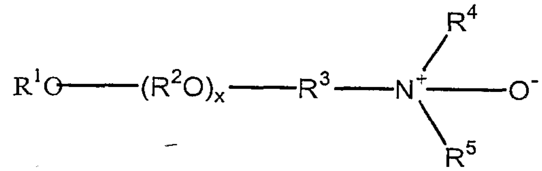


(38)

wherein R^1, R^2 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^4O)_xR^5$, or $-R^6(OR^4)_xOR^5$; R^4 in each of the x (R^4 O) groups is independently C_2-C_4 alkylene, R^5 is hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^6 is a hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, x is an average number from 1 to about 50, and the total number of carbon

atoms in R^1, R^2 and R^3 is at least 8. In this context, preferred R^1, R^2, R^3, R^5 and R^6 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably,R^1 and R^2 are independently hydrogen, a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms, or $-(R^4O)_xR^5$; R^3 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 30 carbon atoms, R^4 in each of the x (R^4O) groups is independently C_2-C_4 alkylene; R^5 is hydrogen or a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms, and x is an average number from 1 to about 30. More preferably, R^1 and R^2 are independently hydrogen, or a linear or branched alkyl group having from 1 to about 6 carbon atoms, and R^3 is a linear or branched alkyl group having from about 8 to about 22 carbon atoms; or R^1 and R^2 are independently $-(R^4O)_xR^5$, R^3 is a linear or branched alkyl group having from about 8 to about 22 carbon atoms, R^4 in each of the x (R^4O) groups is ethylene or propylene, R^5 is hydrogen or a linear or branched alkyl or linear or branched alkenyl group having from 1 to about 30 carbon atoms, and x is an average number from 1 to about 10. Most preferably, R^1 and R^2 are independently methyl, and R^3 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms; or R^1 and R^2 are independently $-(R^4O)_xR^5$, R^3 is a linear or branched alkyl group having from about 8 to about 18 carbon atoms, R^4 in each of the x (R^4O) groups is ethylene or propylene, R^5 is hydrogen or an alkyl group having from about 8 to about 18 carbon atoms, and x is an average number from 1 to about 5. Commercially available amine oxide surfactants include Chemoxide L70.

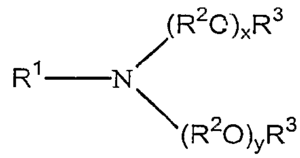
(t) alkoxylated amine oxides having the formula:



(39)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 is a hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^4 and R^5 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^6)_n-(R^2O)_yR^7$; R^6 is hydrocarbylene or substituted hydrocarbylene containing from 1 to about 6 carbon atoms, R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms, n is 0 or 1, and x and y are independently an average number from 1 to about 60. In this context, preferred R^1, R^4, R^5 and R^6 hydrocarbyl (hydrocarbylene) groups include linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 25 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is a linear or branched alkylene or alkenylene group having from 2 to about 6 carbon atoms, R^4 and R^5 are each independently hydrogen or a linear or branched alkyl group having from 1 to about 6 carbon atoms, and x is an average number from 1 to about 30. More preferably, R^1 is a linear or branched alkyl group having from about 12 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is a linear or branched alkylene or alkenylene group having from 2 to about 6 carbon atoms, R^4 and R^5 are each independently hydrogen, methyl, or tris(hydroxymethyl)methyl, and x is an average number from about 2 to about 30. Even more preferably, R^1 is a linear or branched alkyl group having from about 12 to about 18 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is an ethylene, propylene or 2-hydroxypropylene group, R^4 and R^5 are each independently hydrogen or methyl, and x is an average number from about 4 to about 20. Most preferably, R^1 is a linear or branched alkyl group having from about 12 to about 18 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is an ethylene, propylene, or 2-hydroxypropylene group, R^4 and R^5 are methyl, and x is an average number from about 4 to about 20.

(u) dialkoxylated amines having the formula:

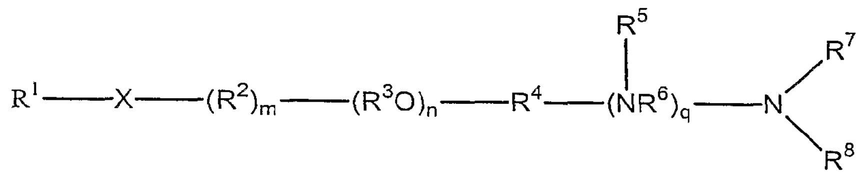


(40)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-R^4SR^5$, or $-(R^2O)_zR^3$, R^2 in each of the x (R^2O), y (R^2O) and z (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^4 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^5 is a linear or branched alkyl group having from about 4 to about 15 carbon atoms, and x, y and z are independently an average number from 1 to about 40. In this context, preferred R^1 hydrocarbyl groups are hydrogen, linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, R^1 is hydrogen, a linear or branched alkynyl, aryl, or aralkyl group having from about 1 to about 30 carbon atoms, R^2 in each of the x (R^2O), y (R^2O) and z (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, methyl or ethyl, and x and y are independently an average number from 1 to about 20. More preferably, R^1 is hydrogen or a linear or branched alkynyl, aryl, or aralkyl group having from about 8 to about 25 carbon atoms, R^2 in each of the x (R^2O), y (R^2O) and z (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x and y are independently an average number from 1 to about 30. Even more preferably, R^1 is hydrogen or a linear or branched alkynyl, aryl, or aralkyl group having from about 8 to about 22 carbon atoms, R^2 in each of the x (R^2O), y (R^2O) and z (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x and y are independently an average number from 1 to about 5. Preferred commercially available dialkoxylated

amines include Trymeen™ 6617 (from Cognis), TAM 45, 60, 80 and 105 (from Witco), and Ethomeen™ C/12, C/15, C/20, C/25, T/12, T/15, T/20 and T/25 (from Akzo Nobel).

and (v) aminated alkoxylated alcohols having the following chemical structure:



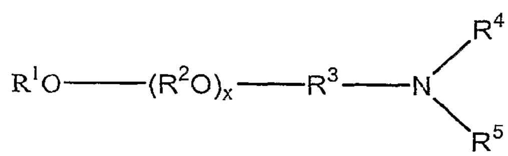
(41)

wherein R^1, R^7, R^8, and R^9 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{11})_s(R^3O)_vR^{10}$; X is -O-, -OC(O)-, -C(O)O-, $-N(R^{12})C(O)-$, $-C(O)N(R^{12})-$, -S-, -SO-, $-SO_2-$ or $-N(R^9)-$; R^3 in each of the n (R^3O) groups and the v (R^3O) groups is independently C_2-C_4 alkylene; R^{10} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{11} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^{12} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; m and s are each independently 0 or 1; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $-C(=NR^{12})-$, -C(S)-, or -C(O)-; q is an integer from 0 to 5; and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms. In this context, preferred R^1, R^2, R^4, R^5, R^6, R^7, R^8, R^9, R^{11} and R^{12} hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups.

In one embodiment, any of the amine or quaternary ammonium surfactants as described in sections (a)–(v) above are included in liquid glyphosate concentrates

other than IPA glyphosate, such as glyphosate concentrates containing potassium, di-ammonium, ammonium, sodium, monoethanolamine, n-propylamine, methylamine, ethylamine, hexamethylenediamine, dimethylamine, or trimethylsulfonium glyphosate and mixtures thereof, which contain a stabilizer and at least about 30 wt.% glyphosate a.e., more preferably at least about 35%, 40%, 45% or more wt.% a.e., or at least about 360 g a.e. glyphosate per liter, more preferably at least 370, 380, 390, 400, 410, 420, 430, 440 or 450 g a.e./l or more.

A subclass of such cationic surfactants described above includes a monoalkoxylated amine having the formula:

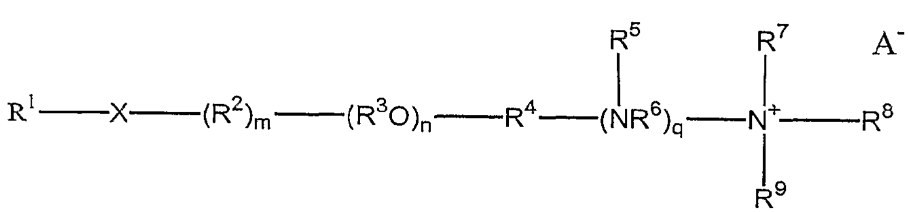


(42)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^4 and R^5 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^6)_n-(R^2O)_yR^7$, or R^4 and R^5, together with the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^6 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 30 carbon atoms; R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms, n is 0 or 1, x and y are independently an average number from 1 to about 60. In this context, preferred R^1, R^3, R^4, R^5, and R^6 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 25

carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is a linear or branched alkylene group having from 2 to about 20 carbon atoms, R^4 and R^5 are each independently hydrogen or a linear or branched alkyl group having from 1 to about 6 carbon atoms, and x is an average number from 1 to about 30. More preferably, R^1 is a linear or branched alkyl group having from about 12 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is a linear or branched alkylene group having from 2 to about 6 carbon atoms, R^4 and R^5 are each independently hydrogen, methyl, or tris(hydroxymethyl)methyl, and x is an average number from about 2 to about 30. Even more preferably, R^1 is a linear or branched alkyl group having from about 12 to about 18 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is ethylene or propylene, R^4 and R^5 are each independently hydrogen, methyl or tris(hydroxymethyl)methyl, and x is an average number from about 4 to about 20. Most preferably, R^1 is a linear or branched alkyl group having from about 12 to about 18 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is ethylene, R^4 and R^5 are methyl, and x is an average number from about 4 to about 20. Preferred monoalkoxylated amines include PEG 13 or 18 C_{14-15} ether propylamines and PEG 7, 10, 15 or 20 C_{16-18} ether propylamines (from Tomah) and PEG 13 or 18 C_{14-15} ether dimethyl propylamines and PEG 10, 15 or 20 or 25 C_{16-18} ether dimethyl propylamines (from Tomah) and Surfonic™ AGM-550 from Huntsman.

Quaternary ammonium, sulfonium and sulfoxonium salts are also effective cationic surfactants in forming potassium glyphosate concentrates and have a chemical structure:



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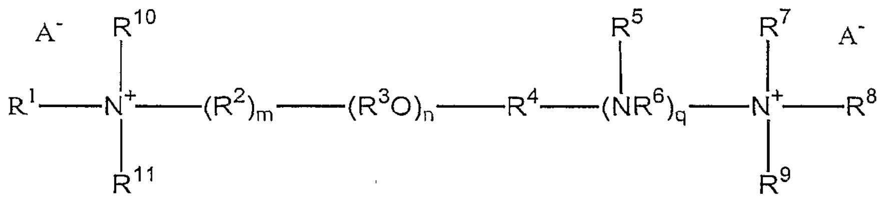

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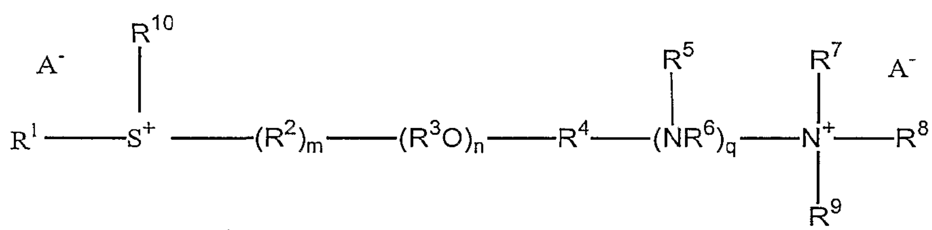

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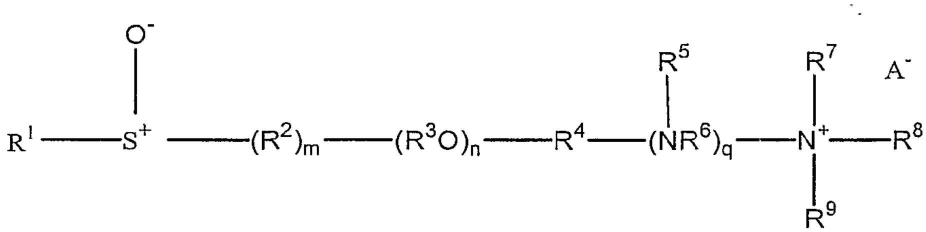
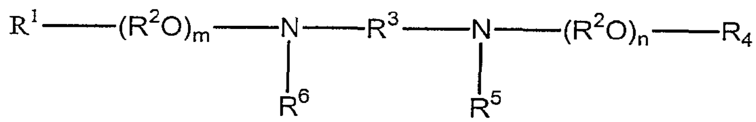


(46)

wherein R^1, R^7, R^8, R^9, R^{10} and R^{11} are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or -$(R^{13})_s(R^3O)_vR^{12}$; X is -O-, -OC(O)-, -N(R^{14})C(O)-, -C(O)N(R^{14})-, -C(O)O-, or -S-; R^3 in each of the n (R^3O) groups and v (R^3O) groups is independently C_2-C_4 alkylene; R^{12} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an

average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{13} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; m and s are each independently 0 or 1; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $-C(=NR^{12})-$, -C(S)-, or -C(O)-; R^{14} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, q is an integer from 0 to 5; R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each A^- is an agriculturally acceptable anion. In this context, preferred R^1, R^2, R^4, R^5, R^6, R^7, R^8, R^9, R^{10}, R^{11}, R^{13}, and R^{14} hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups.

Another cationic surfactant effective in the formulations of the invention is a diamine or diammonium salt having the formula:



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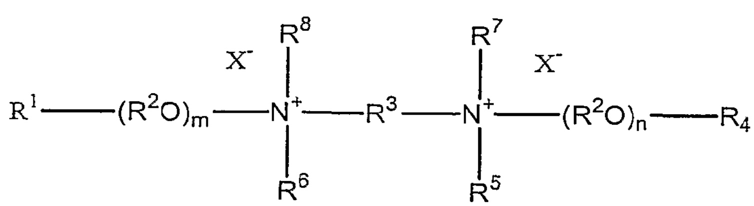
or



(48)

wherein R^1, R^4, R^5, R^6, R^7 and R^8 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the m (R^2O) and n (R^2O) groups and R^9 are independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or $-(R^2O)_pR_9-$, m and n are individually an average number from 0 to about 50,

and p is an average number from 0 to about 60. In this context, preferred R^1, R^3, R^4, R^5, R^6, R^7 and R^8 hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. In one embodiment of formula (44), R^3 is hydrocarbylene having from about 2 to about 6 carbon atoms, and the remaining groups are as defined above.

Some preferred cationic surfactants include alkylamine ethoxylates (including etheramines and diamines) such as tallowamine ethoxylate, cocoamine ethoxylate, etheramine ethoxylate, tallow ethylenediamine ethoxylate and amidoamine ethoxylates; alkylamine quaternary amines such as alkoxylated quaternary amines (e.g., ethoxylated quaternary amines or propoxylated quaternary amines); alkylamine acetates such as tallowamine acetate or octylamine acetate; and amine oxides such as ethoxylated amine oxides (e.g., N,N-bis(2-hydroxyethyl) cocoamine –oxide), nonethoxylated amine oxides (e.g., cethyldimethylamine –oxide) and amidoamine oxides.

Preferred cationic surfactants include amines and quaternary amines substituted with alkoxy groups containing between about 2 and 15 ethoxy and/or propoxy units, and $C_{12\text{-}18}$ alkyl groups. More preferred are $C_{12\text{-}18}$ dialkoxylated amines and quaternary amines. Still more preferred are diethoxylated tallow amines containing between about 4 and about 15 units of ethoxylation, and PEG 2 to 20 tallow ammonium chlorides optionally including a methyl group. Most preferred commercially available dialkoxylated amines include Trymeen™ 6617 (from Cognis), TAM 45, 60, 80 and 105 (from Witco), and Ethomeen™ C/12, C/15, C/20, C/25, T/12, T/15, T/20 and T/25 (from Akzo Nobel). Most preferred dialkoxylated quaternary ammonium surfactants include Ethoquad™ C12, C15, T25 (from Akzo Nobel), and Emcol CC-42 and CC-55 (from CK Witco). Other suitable cationic surfactants may be determined by those skilled in the art by routine experimentation.

The compositions of the invention are stable at glyphosate a.e.:cationic surfactant loadings, on a weight percent basis, of about 1:2 to about 200:1. High glyphosate:cationic surfactant loadings are generally limited by herbicidal efficacy considerations rather than composition stability because sufficient surfactant must be

present for adequate glyphosate activation. High surfactant loading generally requires the inclusion of a stabilizer at a preferred ratio of cationic surfactant:stabilizer between about 1:100 and about 100:1.

Nonionic surfactants suitable for use in formulating the herbicidal compositions and concentrates of the invention include:

(a) alkoxylated alcohols having the formula:

$$R^1O\text{——}(R^2O)_xR^3 \qquad (49)$$

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60. In this context, preferred R^1 hydrocarbyl groups are linear or branched alkyl, linear or branched alkenyl, linear or branched alkynyl, aryl, or aralkyl groups. Preferably, R^1 is a linear or branched alkyl or linear or branched alkenyl group having from about 8 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, methyl or ethyl, and x is an average number from about 5 to about 50. More preferably, R^1 is a linear or branched alkyl group having from about 8 to about 25 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from about 8 to about 40. Even more preferably, R^1 is a linear or branched alkyl group having from about 12 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from about 8 to about 30. Preferred commercially available alkoxylated alcohols include: Emulgin™ L, Procol™ LA-15 (from Protameen); Brij™ 35, Brij™ 56, Brij™ 76, Brij™ 78, Brij™ 97, Brij™ 98 and Tergitol™ XD (from Sigma Chemical Co.); Neodol™ 25-12 and Neodol™ 45-13 (from Shell); hetoxol™ CA-10, hetoxol™ CA-20, hetoxol™ CS-9, hetoxol™ CS-15, hetoxol™ CS-20, hetoxol™ CS-25, hetoxol™ CS-30, Plurafac™ A38 and Plurafac ™ LF700 (from BASF); ST-8303 (from

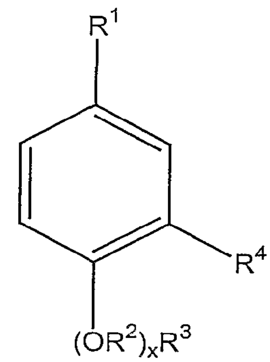
Cognis); Arosurf™ 66 E10 and Arosurf™ 66 E20 (from Witco/Crompton); ethoxylated (9.4 EO) tallow, propoxylated (4.4 EO) tallow and alkoxylated (5-16 EO and 2-5 PO) tallow (from Witco/Crompton).

(b) dialkoxylated alcohols having the formula:

$$R^1(OR^2)_xO — R^3 — O — (R^2O)_yR^1 \qquad (50)$$

wherein R^1 is independently hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^2 in each of the x (R^2O) and the y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, and x and y are independently an average number from 1 to about 60. In this context, preferred R^3 hydrocarbylene groups are linear or branched alkylene, linear or branched alkenylene, linear or branched alkynylene, arylene, or aralkylene groups. Preferably, R^1 is hydrogen, methyl or ethyl, R^2 in each of the x (R^2O) and the y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is a linear or branched alkylene or linear or branched alkenylene group having from about 8 to about 25 carbon atoms, and x and y are independently an average number from about 1 to about 20. More preferably, R^1 is hydrogen or methyl, R^2 in each of the x (R^2O) and the y (R^2O) groups is independently ethylene or propylene, R^3 is a linear or branched alkylene or linear or branched alkenylene group having from about 8 to about 18 carbon atoms, and x and y are independently an average number from 1 to about 10. Even more preferably, R^1 is hydrogen, R^2 in each of the x (R^2O) and the y (R^2O) groups is independently ethylene or propylene, R^3 is a linear or branched alkylene group having from about 8 to about 18 carbon atoms, and x and y are independently an average number from 1 to about 5.

(c) alkoxylated dialkylphenols having the formula:



(51)

wherein R^1 and R^4 are independently hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms and at least one of R^1 and R^4 is an alkyl group, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60. Preferably, R^1 and R^4 are independently linear or branched alkyl groups having from 8 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, methyl or ethyl, and x is an average number from about 5 to about 50. More preferably, R^1 and R^4 are independently linear or branched alkyl groups having from about 8 to about 22 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from about 8 to about 40. Even more preferably, R^1 and R^4 are independently linear or branched alkyl groups having from about 8 to about 16 carbon atoms, R^2 in each of the x (R^2O) groups is independently ethylene or propylene, R^3 is hydrogen or methyl, and x is an average number from about 10 to about 30. Preferred commercially available alkoxylated dialkylphenols include ethoxylated dinonyl phenols such as Surfonic™ DNP 100, Surfonic™ DNP 140, and Surfonic™ DNP 240 (from Huntsman).

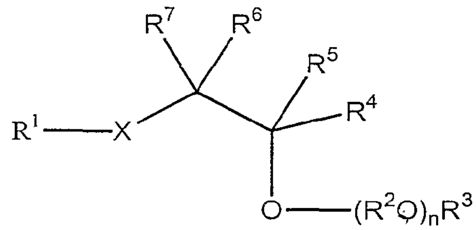
Other suitable nonionic surfactants include alkylpolyglucosides; glycerol esters such as glyceryl monolaurate, and ethyoxylated glyceryl monococoate; ethoxylated

castor oil; ethoxylated reduced sugar esters such as polyoxyethylene sorbitol monolaurate; esters of other polyhydric alcohols such as sorbitan monolaurate and sucrose monostearate; ethoxylated amides such as polyoxyethylene cocoamide; ethoxylated esters such as monolaurate of polyethylene glycol 1000 and dilaurate of polyethylene glycol 6000; ethoxylated alkyl or arylphenols such as nonylphenol ethoxylate, octylphenol ethoxylates, dodecylphenol ethoxylates, dinonylphenol ethoxylates and tristyrylphenol ethoxylates; alcohol ethoxylates such as fatty alcohol ethoxylates (e.g., oleyl alcohol ethoxylate), tridecylalcohol ethoxylates and other alcohol ethoxylates such as Neodols and oxoalcohol ethoxylates; and ethylene oxide/propylene oxide copolymers such as Pluronic type, Tetronic type, or Tergitol XH type.

Additional nonionic surfactants for inclusion in surfactant compositions that may be used in the invention are polyoxyethylene (5-30) C_{8-22} alkylethers and polyoxyethylene (5-30) C_{8-12} alkylphenylethers, wherein "(5-30)" means that the average number of ethylene oxide units in the polyoxyethylene chains of these surfactants is from about 5 to about 30. Examples of such nonionic surfactants include polyoxyethylene nonylphenols, octanols, decanols and trimethylnonanols. Particular nonionic surfactants that have proved useful include NEODOL™ 91-6 of Shell (a polyoxyethylene (6) C_{9-11} linear primary alcohol), NEODOL™ 1-7 of Shell (a polyoxyethylene (7) C_{11} linear primary alcohol), TERGITOL™ 15-S-9 of Union Carbide (a polyoxyethylene (9) C_{12-15} secondary alcohol) and SURFONIC™ NP95 of Huntsman (a polyoxyethylene (9.5) nonylphenol).

Preferred nonionic surfactants include alkoxylated alcohols comprising about 5 to about 25 ethoxy and propoxy groups and a C_{12-18} alkyl group. More preferred are about 10 to about 20 alkoxylated C_{16-18} alcohols. Non-exclusive examples include the commercially available products Emulgin-L, Arosurf 66 and Plurafac P700. Other suitable nonionic surfactants may be determined by those skilled in the art by routine experimentation.

Other surfactants for use in herbicidal compositions and concentrates of the invention include compounds of the formula:



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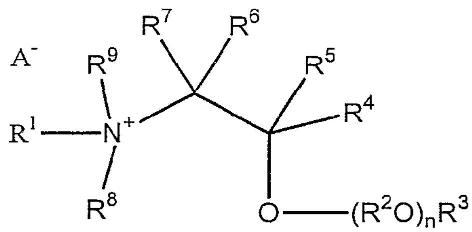

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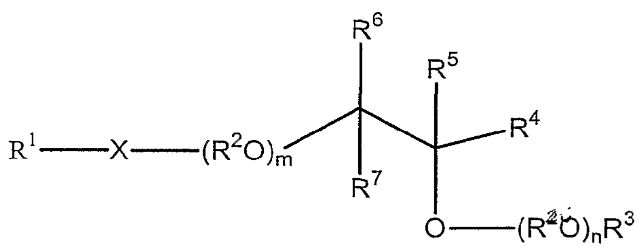

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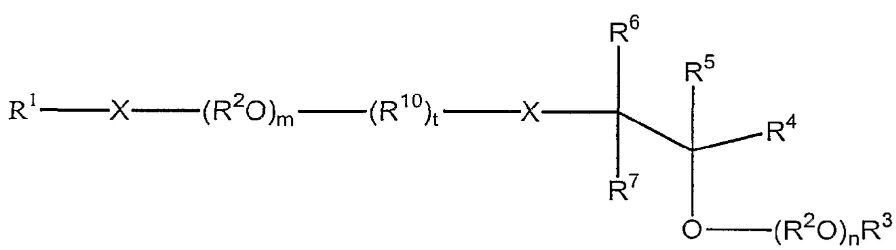

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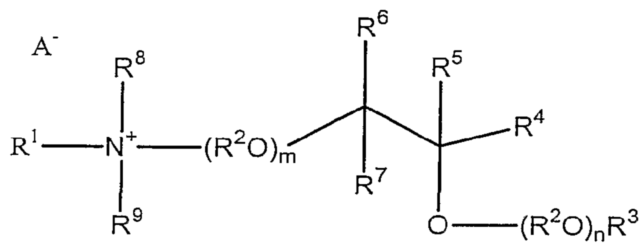

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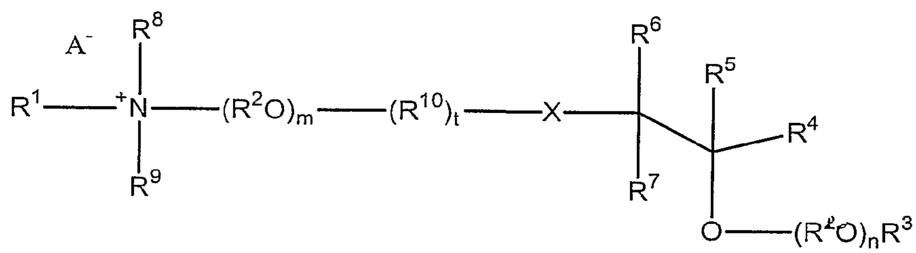

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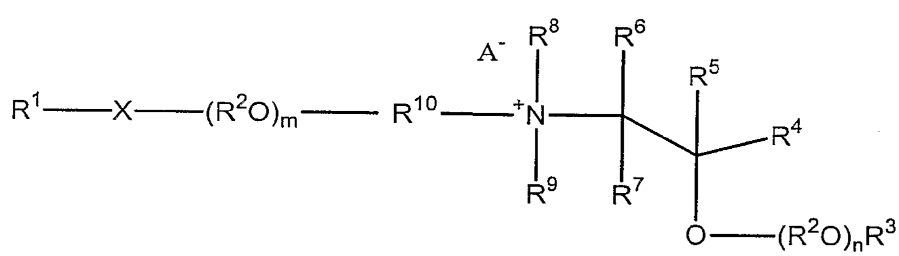

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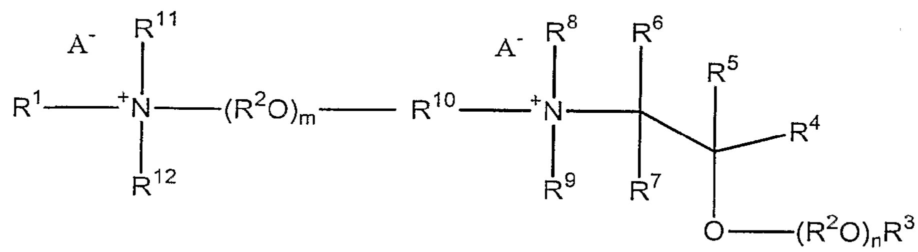

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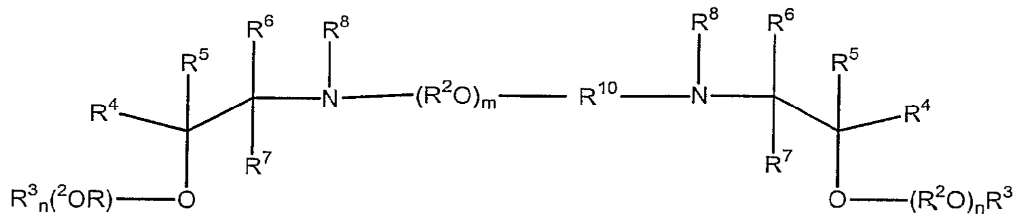


(59A)

wherein R^1, R^9, and R^{12} are independently hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^2O)_pR^{13}$; R^2 in each of the m (R^2O), n (R^2O), p (R^2O) and q (R^2O) groups is independently C_2-C_4 alkylene; R^3, R^8, R^{11}, R^{13} and R^{15} are independently hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^4 is $-(CH_2)_yOR^{13}$ or $-(CH_2)_yO(R^2O)_qR^3$; R^5, R^6 and R^7 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or R^4; R^{10} is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(CH_2)_zO(R^2O)_pR^3$; m, n, p and q are independently an average number from 1 to about 50; X is independently -O-, $-N(R^{14})-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^{15})C(O)-$,

$-C(O)N(R^{15})-$, -S-, -SO-, or $-SO_2-$; t is 0 or 1; A- is an agriculturally acceptable anion; and y and z are independently an integer from 0 to about 30. In this context, preferred R^1, R^3, and R^5-R^{15} hydrocarbyl (hydrocarbylene) groups are linear or branched alkyl (alkylene), linear or branched alkenyl (alkenylene), linear or branched alkynyl (alkynylene), aryl (arylene), or aralkyl (aralkylene) groups. Preferably, R^1, R^9, and R^{12} are independently linear or branched alkyl or alkenyl groups having from 1 to about 22 carbon atoms, or $-(R^2O)_pR^{13}$; R^2 in each of the m (R^2O), n (R^2O), p (R^2O) and q (R^2O) groups is independently C_2-C_4 alkylene; R^3 is hydrogen, methyl or ethyl; R^4 is $-(CH_2)_yOR^{13}$ or $-(CH_2)_yO(R^2O)_qR^3$; R^5, R^6 and R^7 are independently hydrogen, linear or branched alkyl or alkenyl groups having from 1 to about 22 carbon atoms, or R^4; R^8, R^{11}, R^{13} and R^{15} are independently hydrogen, or linear or branched alkyl or alkenyl groups having from 1 to about 22 carbon atoms; R^{10} is a linear or branched alkylene or alkenylene group having from 2 to about 18 carbon atoms; R^{14} is a linear or branched alkyl or alkenyl group having from 1 to about 22 carbon atoms, or $-(CH_2)_zO(R^2O)_pR^3$; m, n, p and q are independently an average number from 1 to about 30; X is independently -O-, $-N(R^{14})-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^{15})C(O)-$, $-C(O)N(R^{15})-$, -S-, -SO-, or $-SO_2-$, t is 0 or 1; A- is an agriculturally acceptable anion; and y and z are independently an integer from 0 to about 30. More preferably, R^1 is a linear or branched alkyl or alkenyl groups having from about 8 to about 18 carbon atoms, or $-(R^2O)_pR^{13}$; R^9 and R^{12} are independently linear or branched alkyl or alkenyl groups having from 1 to about 22 carbon atoms, or $-(R^2O)_pR^{13}$; R^2 in each of the m (R^2O), n (R^2O), p (R^2O) and q (R^2O) groups is independently ethylene or propylene; R^3 is hydrogen or methyl; R^4 is $-(CH_2)_yOR^{13}$ or $-(CH_2)_yO(R^2O)_qR^3$; R^8, R^{11}, R^{15} are independently hydrogen, or linear or branched alkyl or alkenyl groups having from 1 to about 22 carbon atoms; R^5, R^6 and R^7 are independently hydrogen, linear or branched alkyl or alkenyl groups having from 1 to about 22 carbon atoms, or R^4; R^{10} is a linear or branched alkylene or alkenylene group having from 2 to about 6 carbon atoms; R^{13} is hydrogen, or linear or branched alkyl or alkenyl groups having from about 6 to about 22 carbon atoms; R^{14} is a linear or branched alkyl or alkenyl group having from 1 to about 22 carbon atoms, or $-(CH_2)_zO(R^2O)_pR^3$; m, n, p and q are independently an average number from 1 to about 20; X is independently -O-,

$-N(R^{14})-$, $-C(O)-$, $-C(O)O-$, $-OC(O)-$, $-N(R^{15})C(O)-$, $-C(O)N(R^{15})-$, $-S-$, $-SO-$, or $-SO_2-$, t is 0 or 1; A- is an agriculturally acceptable anion; and y and z are independently an integer from 0 to about 10. Most preferably, R^1 is a linear or branched alkyl or alkenyl groups having from about 12 to about 18 carbon atoms, or $-(R^2O)_pR^{13}$; R^9 and R^{12} are independently linear or branched alkyl or alkenyl groups having from 1 to about 6 carbon atoms, or $-(R^2O)_pR^{13}$; R^2 in each of the m (R^2O), n (R^2O), p (R^2O) and q (R^2O) groups is independently ethylene or propylene; R^3 is hydrogen; R^4 is $-(CH_2)_yOR^{13}$ or $-(CH_2)_yO(R^2O)_qR^3$; R^8, R^{11}, R^{15} are independently hydrogen, or linear or branched alkyl or alkenyl groups having from 1 to about 6 carbon atoms; R^5, R^6 and R^7 are independently hydrogen, linear or branched alkyl or alkenyl groups having from 1 to about 22 carbon atoms, or R^4; R^{10} is a linear or branched alkylene or alkenylene group having from 2 to about 6 carbon atoms; R^{13} is hydrogen, or linear or branched alkyl or alkenyl groups having from about 6 to about 22 carbon atoms; R^{14} is a linear or branched alkyl or alkenyl group having from 1 to about 22 carbon atoms, or $-(CH_2)_zO(R^2O)_pR^3$; m, n, p and q are independently an average number from 1 to about 5; X is independently -O- or $-N(R^{14})-$, t is 0 or 1; A- is an agriculturally acceptable anion; and y and z are independently an integer from 1 to about 3.

Fluoro-organic wetting agents useful in this invention are organic molecules represented by the formula:

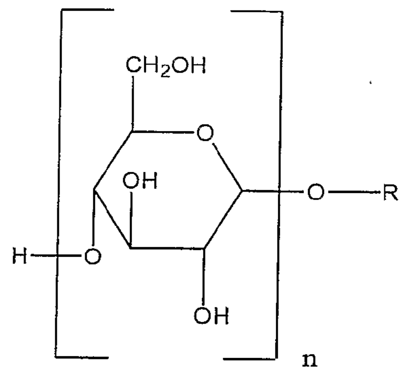
$$R_f\text{-}G \tag{60}$$

wherein R_f is a fluoroaliphatic radical and G is a group which contains at least one hydrophilic group such as cationic or nonionic groups. R_f is a fluorinated, monovalent, aliphatic organic radical containing at least four carbon atoms. Preferably, it is a saturated perfluoroaliphatic monovalent organic radical. However, hydrogen or chlorine atoms can be present as substituents on the skeletal chain. Although radicals containing a large number of carbon atoms can function adequately, compounds containing not more than about 20 carbon atoms are preferred because large radicals usually represent a less efficient utilization of fluorine than is possible with shorter skeletal chains. Preferably, R_f contains about 5 to 14 carbon atoms. The cationic groups which are usable in the fluoro-organic wetting agents employed

in this invention can include an amine or a quaternary ammonium cationic group. Such amine and quaternary ammonium cationic hydrophilic groups can have formulas such as NH_2, NHR^2, $-N(R^2)_2$, $-(NH_3)X$, $-(NH_2R^2)X$, $-(NH(R^2)_2X)$, or $-(N(R^2)_3)X$, where X is an anionic counterion such as halide, hydroxide, sulfate, bisulfate, acetate or carboxylate, and each R^2 is independently a C_{1-18} alkyl group. Preferably, X is halide, hydroxide, or bisulfate. Preferably, the cationic fluoro-organic wetting agents used in this invention contain hydrophilic groups which are quaternary ammonium cationic groups. The nonionic groups which are usable in the fluoro-organic wetting agents employed in this invention include groups which are hydrophilic but which under pH conditions of normal agronomic use are not ionized. The nonionic groups can have formulas such as -O(CH2CH2)XH wherein x is greater than zero, preferably 1-30, $-SO_2NH_2$, $SO_2NHCH_2CH_2OH$, $SO_2N(CH_2CH_2OH)_2$, $-CONH_2$, $-CONHCH_2CH_2OH$, or $-ON(CH_2CH_2OH)_2$. Several fluoro-organic wetting agents suitable for use in the invention are available from 3M under the Fluorad trademark. They include nonionic agents Fluorad FC-170C, Fluorad FC-171 and Fluorad FC-430.

Additional cationic surfactants suitable for use in the herbicidal compositions of the invention are those described in U.S. Patent Nos. 5,703,015, 5,750,468, 5,389,598, 5,563,111, 5,622,911, 5,849,663, 5,863,909, 5,985,794, 6,030,923 and 6,093,679, which are incorporated herein by reference. Cationic fluoro-organic surfactants useful herein include Fluorad FC-750 and other surfactants as described, for example, in U.S. Patent Nos. 2,764,602, 2,764,603, 3,147,064, and 4,069,158.

Alkylpolyglycosides are also suitable for use in the compositions and concentrates of the invention, and are described, for example, in U.S. Patent No. 6,117,820. As used herein the term "alkylglycoside" includes mono- and poly-alkylglycosides. Glycosides are represented by the formula:



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wherein n is the degree of polymerization, or number of glycose groups, and R is a branched or straight chain alkyl group preferably having from 4 to 18 carbon atoms, or a mixture of alkyl groups having an average value within the given range. The number of glycose groups per alkyl group may vary and alkyl mono- or di-, or polyglucose or saccharide derivatives are possible. Commercial alkylpolyglycosides usually contain a mixture of derivatives with n expressed as an average. Preferably n is between 1 and about 5, and more preferably between 1 and about 3. Typical of alkylglycosides is the product commercially available under the trade names AL2042 (Imperial Chemical Industries PLC) wherein n is an average of 1.7 and R is a mixture of octyl (45%) and decyl (55%), the product commercially available under the trade name AGRIMUL PG2069 (Henkel Corp) wherein n is an average of 1.6 and R is a mixture of nonyl (20%), decyl (40%) and undecyl (40%), and the product commercially available under the trade name BEROL AG6202 (Akzo Nobel) which is 2-ethyl-1-hexylglycoside.

In one embodiment of the invention, the herbicidal compositions include at least one nonionic surfactant and at least one cationic surfactant such as those described herein. Such surfactant combinations are described in U.S. Patent Nos. 6,245,713 and 5,998,332, which are incorporated herein by reference in their entirety.

Preferably the weight ratio of cationic:nonionic surfactants is between about 20:1 and about 1:1, and more preferably between about 10:1 and about 1:1. In high load glyphosate formulations, stable microemulsions may be achieved at glyphosate a.e.:total surfactant loading, on a weight basis, of about 1:3 to about 100:1. As with embodiments containing only cationic surfactants, high glyphosate:surfactant ratios are generally limited by herbicidal efficacy considerations rather than composition stability because sufficient surfactant must be present to enable adequate glyphosate herbicidal effect. High surfactant loading generally requires the inclusion of a stabilizer at a preferred weight ratio of total surfactant:stabilizer between about 1:50 and about 50:1.

The surfactant component of the invention comprises any combination of the surfactants and stabilizers as described above. The surfactant composition is particularly preferred for use in formulating compositions or concentrates containing potassium, di-ammonium, ammonium, sodium, monoethanolamine, n-propylamine, methylamine, ethylamine, hexamethylenediamine, dimethylamine and/or trimethylsulfonium glyphosate. The surfactant composition can be incorporated into a composition or concentrate comprising any combination of these glyphosate salts.

The density of any glyphosate-containing formulation of the invention is preferably at least 1.3 grams/liter, more preferably at least about 1.305, 1.310, 1.315, 1.320, 1.325, 1.330, 1.335, 1.340, 1.345, 1.350, 1.355, 1.360, 1.365, 1.370, 1.375, 1.380, 1.385, 1.390, 1.395, 1.400, 1.405, 1.410, 1.415, 1.420, 1.425, 1.430, 1.435, 1.440, 1.445, or 1.450 grams/liter.

The surfactant component of the compositions of the present invention may optionally contain a glycol or glycol ether of formula:

$$HO - (R^4O)_x - R^5 \tag{62}$$

wherein R^4 in each of the x (R^4O) groups is independently a linear or branched C_{2-6} alkylene group, x is 1 to about 4, and R^5 is hydrogen or a C_1- C_4 hydrocarbyl group. Contemplated glycols and glycol ethers include but are not limited to monoethylene glycol, diethylene glycol, propylene glycol or the methyl, ethyl, n-propyl, –butyl or

t-butyl ethers thereof, dipropylene glycol or the methyl, ethyl, n-propyl, –butyl or t-butyl ethers thereof, tripropylene glycol, or the methyl, ethyl, n-propyl, –butyl or t-butyl ethers thereof, 1,3-butanediol, 1,4-butanediol, 2-methyl-1,3-propanediol, 2,2-dimethyl-1,3-propanediol, 2-methyl-1,3-pentanediol and 2-methyl-2,4-pentanediol. Preferred are glycols having 4 or more carbon atoms. Of these, 2-methyl-1,3-propanediol and 1,4-butanediol are more preferred glycols.

In the invention, a microemulsion is defined as a liquid system in which a surfactant component is dispersed within a continuous aqueous liquid phase containing a dissolved salt of glyphosate. In order to form, and maintain, the microemulsion, the substantially water-immiscible organic solvent of the invention is employed to attain appropriate stability of the microemulsion. The microemulsions of the invention are physically stable liquid systems which are also storage stable. They are optically transparent at room temperature and are isotropic. They are formed by the gentle admixture of the ingredients and do not require shearing or other addition of energy. The order of additional of ingredients is not a critical aspect of the invention.

Other components such as solvents and organic acids may be added to the microemulsions of the invention to enhance microemulsion stability. These additives generally function to increase solubility or dispersability of the surfactants in the aqueous carrier phase thus enabling the formulation of robust microemulsions exhibiting enhanced thermal and pH stability, reduced viscosity, and high glyphosate loading.

Solvents may be added to the compositions to increase the solubility or dispersibility of the surfactants in the aqueous carrier phase and thereby attain appropriate stability of the microemulsion. Water soluble solvents may be added to increase the solubility of surfactants with a hydrophilic moiety in the aqueous carrier phase. Non-limiting examples of water soluble solvents include acetates, C_{1-6} alkanols, C_{1-6} diols, C_{1-6} alkyl ethers of alkylene glycols and polyalkylene glycols, and mixtures thereof. The alkanol can be selected from methanol, ethanol, n-propanol, isopropanol, the various positional isomers of butanol, pentanol, and hexanol, and mixtures thereof. It may also be possible to utilize in addition to, or in place of, said

alkanols, the diols such as methylene, ethylene, propylene and butylene glycols, and mixtures thereof, and including polyalkylene glycols. Mixtures of hydrophobic and hydrophilic solvents may also be used.

It is preferred to limit the total amount of solvent to preferably no more than about 25%, and more preferably, no more than about 15%, of the composition. A particularly preferred range is about 0-15%. If any of these organic solvents has a solubility of less than 25% in water (at room temperature, 21° C), then the amount of such limited water solubility solvents should not exceed about 5%, with the amount of water soluble solvents (such as ethyl alcohol) then raised to an amount sufficient to maintain the microemulsion. These amounts of solvents are generally referred to as dispersion-effective or solubilizing effective amounts.

Organic acids may be added to the compositions to enhance the stability of the microemulsion. It is believed, without being bound to any particular theory, that organic acids, or their respective salts, stabilize the high load microemulsions by a couple different mechanisms. First, the hydrophilic and hydrophobic portions of the acids function as coupling agents between the aqueous carrier phase and the nonionic moieties of the surfactants. Second, the acids act as buffers thus stabilizing the composition pH. Suitable organic acids include, among others, acetic, dichloroacetic, citric, malic, oxalic, salicylic and tartaric. Effective concentrations of organic acids are generally between about 0.1 wt% and 5 wt%.

Other additives including inorganic acids and oxidizing agents may be added to the compositions of the invention to enhance microemulsion stability. Non-limiting examples include boric acid, perchloric acid, phosphoric acid, sulfuric acid, hydrogen peroxide, lithium perchlorate, sodium phosphate, sodium chlorate and sodium iodide.

The present invention also includes a method for killing or controlling weeds or unwanted vegetation comprising the steps of diluting a liquid concentrate in a convenient amount of water to form a tank mix and applying a herbicidally effective amount of the tank mix to the foliage of the weeds or unwanted vegetation. Similarly included in the invention is the method of killing or controlling weeds or unwanted vegetation comprising the steps of diluting a solid particulate concentrate in a

convenient amount of water to form a tank mix and applying a herbicidally effective amount of the tank mix to the foliage of the weeds or unwanted vegetation.

In a herbicidal method of using a composition of the invention, the composition is diluted in a suitable volume of water to provide an application solution which is then applied to foliage of a plant or plants at an application rate sufficient to give a desired herbicidal effect. This application rate is usually expressed as amount of glyphosate per unit area treated, *e.g.*, grams acid equivalent per hectare (g a.e./ha). What constitutes a "desired herbicidal effect" is, typically and illustratively, at least 85% control of a plant species as measured by growth reduction or mortality after a period of time during which the glyphosate exerts its full herbicidal or phytotoxic effects in treated plants. Depending on plant species and growing conditions, that period of time can be as short as a week, but normally a period of at least two weeks is needed for glyphosate to exert its full effect.

The selection of application rates that are herbicidally effective for a composition of the invention is within the skill of the ordinary agricultural scientist. Those of skill in the art will likewise recognize that individual plant conditions, weather and growing conditions, as well as the specific active ingredients and their weight ratio in the composition, will influence the degree of herbicidal effectiveness achieved in practicing this invention. With respect to the use of glyphosate compositions, much information is known about appropriate application rates. Over two decades of glyphosate use and published studies relating to such use have provided abundant information from which a weed control practitioner can select glyphosate application rates that are herbicidally effective on particular species at particular growth stages in particular environmental conditions.

The method of the present invention where the water-soluble herbicide is glyphosate, more particularly a water-soluble glyphosate salt, is applicable to any and all plant species on which glyphosate is biologically effective as a herbicide. This encompasses a very wide variety of plant species worldwide. Likewise, compositions of the invention containing a glyphosate salt can be applied to any and all plant species on which glyphosate is biologically effective. Therefore, for example, compositions of the invention containing glyphosate as an herbicidal active ingredient

can be applied to a plant in a herbicidally effective amount, and can effectively control one or more plant species of one or more of the following genera without restriction: *Abutilon, Amaranthus, Artemisia, Asclepias, Avena, Axonopus, Borreria, Brachiaria, Brassica, Bromus, Chenopodium, Cirsium, Commelina, Convolvulus, Cynodon, Cyperus, Digitaria, Echinochloa, Eleusine, Elymus, Equisetum, Erodium, Helianthus, Imperata, Ipomoea, Kochia, Lolium, Malva, Oryza, Ottochloa, Panicum, Paspalum, Phalaris, Phragmites, Polygonum, Portulaca, Pteridium, Pueraria, Rubus, Salsola, Setaria, Sida, Sinapis, Sorghum, Triticum, Typha, Ulex, Xanthium* and *Zea*.

Particularly important annual broadleaf species for which glyphosate compositions are used are exemplified without limitation by the following: velvetleaf (*Abutilon theophrasti*), pigweed (*Amaranthus* spp.), buttonweed (*Borreria* spp.), oilseed rape, canola, indian mustard, *etc.* (*Brassica* spp.), commelina (*Commelina* spp.), filaree (*Erodium* spp.), sunflower (*Helianthus* spp.), morningglory (*Ipomoea* spp.), kochia (*Kochia scoparia*), mallow (*Malva* spp.), wild buckwheat, smartweed, *etc.* (*Polygonum* spp.), purslane (*Portulaca* spp.), russian thistle (*Salsola* spp.), sida (*Sida* spp.), wild mustard (*Sinapis arvensis*) and cocklebur (*Xanthium* spp.)

Particularly important annual narrowleaf species for which glyphosate compositions are used are exemplified without limitation by the following: wild oat (*Avena fatua*), carpetgrass (*Axonopus* spp.), downy brome (*Bromus tectorum*), crabgrass (*Digitaria* spp.), Japanese millet (*Echinochloa crus-galli*), goosegrass (*Eleusine indica*), annual ryegrass (*Lolium multiflorum*), rice (*Oryza sativa*), ottochloa (*Ottochloa nodosa*), bahiagrass (*Paspalum notatum*), canarygrass (*Phalaris* spp.), foxtail (*Setaria* spp.), wheat (*Triticum aestivum*) and corn (*Zea mays*).

Particularly important perennial broadleaf species for which glyphosate compositions are used are exemplified without limitation by the following mugwort (*Artemisia* spp.), milkweed (*Asclepias* spp.), canada thistle (*Cirsium arvense*), field bindweed (*Convolvulus arvensis*) and kudzu (*Pueraria* spp.).

Particularly important perennial narrowleaf species for which glyphosate compositions are used are exemplified without limitation by the following: brachiaria (*Brachiaria* spp.), bermudagrass (*Cynodon dactylon*), yellow nutsedge (*Cyperus esculentus*), purple nutsedge (*C. rotundus*), quackgrass (*Elymus repens*), lalang

(*Imperata cylindrica*), perennial ryegrass (*Lolium perenne*), guineagrass (*Panicum maximum*), dallisgrass (*Paspalum dilatatum*), reed (*Phragmites* spp.), johnsongrass (*Sorghum halepense*) and cattail (*Typha* spp.).

Other particularly important perennial species for which glyphosate compositions are used are exemplified without limitation by the following: horsetail (*Equisetum* spp.), bracken (*Pteridium aquilinum*), blackberry (*Rubus* spp.) and gorse (*Ulex europaeus*).

Thus, for example, the glyphosate compositions of the present invention, and a process for treating plants with such compositions, can be useful on any of the above species. In a particular contemplated process, a plant treatment composition is formed by diluting a composition of the invention in a suitable volume of water for application to a field. Preferably, a plant treatment composition comprising glyphosate is formed by diluting a composition of the present invention in water and the plant treatment composition is applied to weeds or undesired plants.

Application of plant treatment compositions to foliage of plants is preferably accomplished by spraying, using any conventional means for spraying liquids, such as spray nozzles or spinning-disk atomizers. Compositions of the present invention can be used in precision farming techniques, in which apparatus is employed to vary the amount of exogenous chemical substance applied to different parts of a field, depending on variables such as the particular plant species present, plant growth stage, soil moisture status, *etc.* In one embodiment of such techniques, a global positioning system operated with the spraying apparatus can be used to apply the desired amount of the composition to different parts of a field.

A plant treatment composition is preferably dilute enough to be readily sprayed using standard agricultural spray equipment. Suitable application rates for the present invention vary depending upon such factors as the type and concentration of active ingredient and the plant species involved. Useful rates for applying an aqueous composition to a field of foliage can range from about 25 to about 1,000 liters per hectare (l/ha), preferably about 50 to about 300 l/ha, by spray application.

DEFINITIONS

The terms "hydrocarbon" and "hydrocarbyl" as used herein describe organic compounds or radicals consisting exclusively of the elements carbon and hydrogen. These moieties include alkyl, alkenyl, alkynyl, and aryl moieties. These moieties also include alkyl, alkenyl, alkynyl, and aryl moieties substituted with other aliphatic or cyclic hydrocarbon groups, such as alkaryl, alkenaryl and alkynaryl. Unless otherwise indicated, these moieties preferably comprise 1 to 30 carbon atoms.

The term "hydrocarbylene" as used herein describes radicals joined at two ends thereof to other radicals in an organic compound, and which consist exclusively of the elements carbon and hydrogen. These moieties include alkylene, alkenylene, alkynylene, and arylene moieties. These moieties also include alkyl, alkenyl, alkynyl, and aryl moieties substituted with other aliphatic or cyclic hydrocarbon groups, such as alkaryl, alkenaryl and alkynaryl. Unless otherwise indicated, these moieties preferably comprise 1 to 30 carbon atoms.

The "substituted hydrocarbyl" moieties described herein are hydrocarbyl moieties which are substituted with at least one atom other than carbon, including moieties in which a carbon chain atom is substituted with a hetero atom such as nitrogen, oxygen, silicon, phosphorous, boron, sulfur, or a halogen atom. These substituents include halogen, heterocyclo, alkoxy, alkenoxy, alkynoxy, aryloxy, hydroxy, protected hydroxy, ketal, acyl, acyloxy, nitro, amino, amido, cyano, thiol, acetal, sulfoxide, ester, thioester, ether, thioether, hydroxyalkyl, urea, guanidine, amidine, phosphate, amine oxide, and quaternary ammonium salt.

The "substituted hydrocarbylene" moieties described herein are hydrocarbylene moieties which are substituted with at least one atom other than carbon, including moieties in which a carbon chain atom is substituted with a hetero atom such as nitrogen, oxygen, silicon, phosphorous, boron, sulfur, or a halogen atom. These substituents include halogen, heterocyclo, alkoxy, alkenoxy, alkynoxy, aryloxy, hydroxy, protected hydroxy, ketal, acyl, acyloxy, nitro, amino, amido, cyano, thiol, acetal, sulfoxide, ester, thioester, ether, thioether, hydroxyalkyl, urea, guanidine, amidine, phosphate, amine oxide, and quaternary ammonium salt.

Unless otherwise indicated, the alkyl groups described herein are preferably lower alkyl containing from one to 18 carbon atoms in the principal chain and up to 30 carbon atoms. They may be straight or branched chain or cyclic and include methyl, ethyl, propyl, isopropyl, n-butyl, isobutyl, hexyl, 2-ethylhexyl, and the like.

Unless otherwise indicated, the alkenyl groups described herein are preferably lower alkenyl containing from two to 18 carbon atoms in the principal chain and up to 30 carbon atoms. They may be straight or branched chain or cyclic and include ethenyl, propenyl, isopropenyl, butenyl, isobutenyl, hexenyl, and the like.

Unless otherwise indicated, the alkynyl groups described herein are preferably lower alkynyl containing from two to 18 carbon atoms in the principal chain and up to 30 carbon atoms. They may be straight or branched chain and include ethynyl, propynyl, butynyl, isobutynyl, hexynyl, and the like.

The terms "aryl" as used herein alone or as part of another group denote optionally substituted homocyclic aromatic groups, preferably monocyclic or bicyclic groups containing from 6 to 12 carbons in the ring portion, such as phenyl, biphenyl, naphthyl, substituted phenyl, substituted biphenyl or substituted naphthyl. Phenyl and substituted phenyl are the more preferred aryl.

The term "aralkyl" as used herein denotes a group containing both alkyl and aryl structures such as benzyl.

As used herein, the alkyl, alkenyl, alkynyl, aryl and aralkyl groups can be substituted with at least one atom other than carbon, including moieties in which a carbon chain atom is substituted with a hetero atom such as nitrogen, oxygen, silicon, phosphorous, boron, sulfur, or a halogen atom. These substituents include hydroxy, nitro, amino, amido, nitro, cyano, sulfoxide, thiol, thioester, thioether, ester and ether, or any other substituent which can increase the compatibility of the surfactant and/or its efficacy enhancement in the potassium glyphosate formulation without adversely affecting the storage stability of the formulation.

The terms "halogen" or "halo" as used herein alone or as part of another group refer to chlorine, bromine, fluorine, and iodine. Fluorine substituents are often preferred in surfactant compounds.

Unless otherwise indicated, the term "hydroxyalkyl" includes alkyl groups substituted with at least one hydroxy group, and includes bis(hydroxyalkyl)alkyl, tris(hydroxyalkyl)alkyl and poly(hydroxyalkyl)alkyl groups. Preferred hydroxyalkyl groups include hydroxymethyl ($-CH_2OH$), and hydroxyethyl ($-C_2H_4OH$), bis(hydroxymethyl)methyl ($-CH(CH_2OH)_2$), and tris(hydroxymethyl)methyl ($-C(CH_2OH)_3$).

The term "cyclic" as used herein alone or as part of another group denotes a group having at least one closed ring, and includes alicyclic, aromatic (arene) and heterocyclic groups.

The terms "heterocyclo" or "heterocyclic" as used herein alone or as part of another group denote optionally substituted, fully saturated or unsaturated, monocyclic or bicyclic, aromatic or nonaromatic groups having at least one heteroatom in at least one ring, and preferably 5 or 6 atoms in each ring. The heterocyclo group preferably has 1 or 2 oxygen atoms, 1 or 2 sulfur atoms, and/or 1 to 4 nitrogen atoms in the ring, and may be bonded to the remainder of the molecule through a carbon or heteroatom. Exemplary heterocyclo include heteroaromatics such as furyl, thienyl, pyridyl, oxazolyl, pyrrolyl, indolyl, quinolinyl, or isoquinolinyl and the like, and non-aromatic heterocyclics such as tetrahydrofuryl, tetrahydrothienyl, piperidinyl, pyrrolidino, etc. Exemplary substituents include one or more of the following groups: hydrocarbyl, substituted hydrocarbyl, keto, hydroxy, protected hydroxy, acyl, acyloxy, alkoxy, alkenoxy, alkynoxy, aryloxy, halogen, amido, amino, nitro, cyano, thiol, thioester, thioether, ketal, acetal, ester and ether.

The term "heteroaromatic" as used herein alone or as part of another group denote optionally substituted aromatic groups having at least one heteroatom in at least one ring, and preferably 5 or 6 atoms in each ring. The heteroaromatic group preferably has 1 or 2 oxygen atoms, 1 or 2 sulfur atoms, and/or 1 to 4 nitrogen atoms in the ring, and may be bonded to the remainder of the molecule through a carbon or heteroatom. Exemplary heteroaromatics include furyl, thienyl, pyridyl, oxazolyl, pyrrolyl, indolyl, quinolinyl, or isoquinolinyl and the like. Exemplary substituents include one or more of the following groups: hydrocarbyl, substituted hydrocarbyl, keto, hydroxy, protected hydroxy, acyl, acyloxy, alkoxy, alkenoxy, alkynoxy, aryloxy,

halogen, amido, amino, nitro, cyano, thiol, thioether, thioester, ketal, acetal, ester and ether.

The term "acyl," as used herein alone or as part of another group, denotes the moiety formed by removal of the hydroxyl group from the group -COOH of an organic carboxylic acid, e.g., RC(O)-, wherein R is R^1, R^1O-, R^1R^2N-, or R^1S-, R^1 is hydrocarbyl, heterosubstituted hydrocarbyl, or heterocyclo and R^2 is hydrogen, hydrocarbyl or substituted hydrocarbyl.

The term "acyloxy," as used herein alone or as part of another group, denotes an acyl group as described above bonded through an oxygen linkage (--O--), e.g., RC(O)O- wherein R is as defined in connection with the term “acyl.”

When a maximum or minimum "average number" is recited herein with reference to a structural feature such as oxyethylene units or glucoside units, it will be understood by those skilled in the art that the integer number of such units in individual molecules in a surfactant preparation typically varies over a range that can include integer numbers greater than the maximum or smaller than the minimum "average number." The presence in a composition of individual surfactant molecules having an integer number of such units outside the stated range in "average number" does not remove the composition from the scope of the present invention, so long as the "average number" is within the stated range and other requirements are met.

The term “pesticide” includes chemicals and microbial agents used as active ingredients of products for control of crop and lawn pests and diseases, animal ectoparasites, and other pests in public health. The term also includes plant growth regulators, pest repellants, synergists, herbicide safeners (which reduce the phytotoxicity of herbicides to crop plants) and preservatives, the delivery of which to the target may expose dermal and especially ocular tissue to the pesticide.

EXAMPLES

The following Examples are provided for illustrative purposes only and are not intended to limit the scope of the present invention. The Examples will permit better understanding of the invention and perception of its advantages and certain variations of execution.

Spray compositions of the Examples contained an exogenous chemical, such as glyphosate potassium salt, in addition to the excipient ingredients listed. The amount of exogenous chemical was selected to provide the desired rate in grams per hectare (g/ha) when applied in a spray volume of 93 l/ha. Several exogenous chemical rates were applied for each composition. Thus, except where otherwise indicated, when spray compositions were tested, the concentration of exogenous chemical varied in direct proportion to exogenous chemical rate, but the concentration of excipient ingredients was held constant across different exogenous chemical rates.

Concentrate compositions were tested by dilution, dissolution or dispersion in water to form spray compositions. In these spray compositions prepared from concentrates, the concentration of excipient ingredients varied with that of exogenous chemical.

In the following Examples illustrative of the invention, greenhouse and field tests were conducted to evaluate the relative herbicidal effectiveness of glyphosate compositions. Compositions included for comparative purposes may be identified as follows:

Composition	Formulation
Composition 570I	570 g/l of glyphosate IPA salt in aqueous solution with no added surfactant
Composition 41I	41% by weight of glyphosate IPA salt in aqueous solution, together with phosphate ester and tallow amine surfactants. This formulation is sold by Monsanto Company under the Roundup Ultra® trademark.
Composition 725K	725 g/l potassium glyphosate salt in aqueous solution with no surfactant
Composition 304I	30.4 wt.% glyphosate a.e. as IPA salt, 3.3 wt.% 2,4-D a.e. as IPA salt, and 9.76% of ethoxylated tallowamines and dipropylene glycol
Composition IPA	Glyphosate
Roundup® UltraMax	50% by weight (445 g a.e./l) of glyphosate IPA salt in aqueous solution, together with surfactant. This formulation is sold by onsanto Company under the Roundup® UltraMax trademark.

Various excipients were used in compositions of the Examples. They may be identified as follows:

C1	2'ethylhexylamine	
C2	5'methyl glutamate	
C3	EXP-81	experimental cationic surfactant di-C_{12} di-EO 10 ammonium chloride
C5	EXP-86-B	experimental nonionic C_{16-18} PO (3.1) EO (10.4)
C6	Acetic Acid (diCl)	di chloro acetic acid
C7	Acetic Acid	
C8	Adma 8	Octyldimethyl amine
C9	Adma WC	C_{8-20} alkyldimethylamine blend
C10	ADMOX	myristyl dimethyl amine oxide
C11	Arosurf 66-E10	PEG-20 isostearyl ether
C13	Alkamide DC-212	Cocoamine DEA
C14	Armeen C	Mixed C_{8-16} alkyl primary amine
C15	Aromatic 150	Toluene
C16	EXP-01A	experimental nonionic C_{16-18} EO (9.4)
C17	EXP-01B	experimental nonionic C_{16-18} EO (9.4) PO (2.2)
C18	EXP-01C	experimental nonionic C_{16-18} EO (9.4) PO (4.2)
C20	EXP-01E	experimental nonionic C_{16-18} EO (9.4) PO (5.3)
C21	EXP-01F	experimental nonionic C_{16-18} EO (9.6) PO (4.4)
C22	EXP-01G	experimental nonionic C_{16-18} PO (4.4)
C23	EXP-01H	experimental nonionic C_{16-18} EO (15.6) PO (4.4)
C24	BG 510	Rhodafac BG 510 ethoxylated alkyl phosphoric acid ester
C25	bis(2'ethylhexylamine)	
C26	Boric Acid	
C27	Brij 56	polyoxyethylene (10 EO) cetyl ether

C28	Brij 78	PEG 20 C_{18} alcohol
C29	BTC 818	Dialkyl dimethyl ammonium chloride
C30	Cetac 30	Cetrimonium chloride (hexadecyltrimethylammonium chloride)
C32	citric acid	
C33	Colloid 111D	Rhodia polyacrylate
C34	dithioerythriol	
C36	Dodecyl trimethyl ammonium bromide	
C37	Dodecyl trimethyl ammonium chloride	
C38	dodecyl trimethyl amide	
C39	diethylene glycol	
C40	Emcol CC-42	Polypropylene glycol-40 diethyl ammonium chloride
C41	Emcol CC-55	
C42	Ethoquad C15	PEG 5 tallow ammonium chloride
C43	Ethoquad T25	PEG 15 tallow methyl ammonium chloride
C44	Ethyl Alcohol	
C45	Ethylene Glycol	
C46	Emulgin-L	Cetereth 2 propoxylate 9 ethoxylate
C47	Ethomeen C12	PEG 2 cocoamine
C48	EXP-BI	experimental nonionic C_{16-18} EO (5) PO (3.1)
C49	Ethoquad C12	PEG 2 coco methyl ammonium chloride
C60	EXP-19	di-coco di EO (15) quaternary ammonium chloride
C61	EXP-195	di-C_{12} di EO (15) (not derived from coco)
C62	EXP-197	dialkyl (tallow and stearyl) di EO (19.6) quaternary ammonium bromide
C63	EXP-113	di-C12 di EO (10) ammonium bromide
C70	Exxate 700	Oxo-heptyl acetate

C71	F88 FL	
C72	Geropan SDS	Sodium dioctyl sulfosuccinate
C73	H_2O_2	
C74	Hexylamine	
C75	Hexanol	
C76	HTMA Br	
C77	Isopar-L	Petroleum naphtha
C78	Isopropylamine	
C79	Plurafac LF 7000	alkoxylated C_{16}-C_{18} alkyl
C80	Lithium Perchlorate	
C81	Makon NF-12	Polyalkoxylated aliphatic base
C82	Malic Acid	
C83	Mirataine	Sodium lauriminodipropionate
C84	MSPO II	mono sodium di hydrogen phosphate
C85	N-propylamine	
C86	Neodol N45-13	C_{14-15} PEG (13)
C87	$NaCl0_3$	
C88	N,N-dimethylhexylamine	
C89	N,N-dimethyloctylamine	
C90	Octadecylamine	
C91	Octylamine	
C92	OTMACl	Octyl trimethyl ammonium chloride
C93	Oxalic Acid	
C94	Perchloric Acid	
C95	Phenyl trimethyl ammonium bromide	
C96	Phosphoric Acid	
C97	Polyethylene Glycol 400	

C98	Propylene Glycol bis(2APE)	
C99	Propylene Glycol 2000	
C100	Rhodapex CD 128	C_{8-10} ethoxylated ammonium sulfate
C101	Rhodapex PA 603	Ammonium Laureth (3 EO) sulfate
C102	Rhodonat LMO	sucro-glyceride derivative
C103	Sodium Salicylate	
C104	Sodium Iodide	
C105	Sulfuric Acid	
C106	TAM MeCl	methyl chloride quaternary form of Witcamine Ethoxylated tallow amine 8 EO (TAM 80)
C107	TAM 45	Ethoxylated tallow amine 4.5 EO
C108	TAM 60	Ethoxylated tallow amine 6 EO
C109	TAM 80	Ethoxylated tallow amine 8 EO
C110	TAM 105	Ethoxylated tallow amine 10.5 EO
C111	tartaric acid	
C112	Tergitol XD	CH3 (CH2)3-O-(CH2 CH2 O)$_{18}$H
C113	tert octyl amine	
C114	THF-OH	
C115	tributylamine	
C116	triethanolamine	
C117	triethylhexylamm Br	
C118	triisooctylamine	
C119	triphenylamine	
C120	Trisodium Citrate	
C121	Varonic-210	cocoamine EO (10)
C122		Xylenes
C123	Surfonic AGM-510	tallowamine ethoxylate (6EO)
C124	Surfonic AGM-550	CAS # 176022-82-5

C125	Armeen DMCD	Dimethylcocoamine
C127	Sigma DPG	Dipropylene Glycol
C128	n-decylamine	
C129		55% TAM 105 + 45% Ethomeen C12
C130	Crompton C-6202	54% TAM 45 + 23% TAM 105 + 23% dipropylene glycol
C131	C-6228	77% TAM 60 +dipropylene glycol
C132	hetoxol CA10	POE 10 Cetyl Ether
C133	hetoxol STA10	POE 10 Stearyl Ether
C134	Tergitol 15-S-9	
C135	Tergitol 15-S-12	
C136	Witco	Ethoxylated (15) tallow ammonium chloride
C137	Ethoquad T20	PEG 10 Tallow methyl ammonium chloride
C138		Polypropylene glycol
C139	Aromatic 100	trimethylbenzene/xylene/cumene mixture
C140	NMP	N-methyl pyrrolidone
C141	Witcamine 405	Witco
C142	PF 8000	Witco
C143	Hetoxol CS15	C_{16-18} alcohol 15 EO
C144	Hetoxol CS20	C_{16-18} alcohol 20 EO
C145	Ethomeen T25	Ethoxylated 15 tallow amine
C146		tetrabutylammonium hydroxide
C147	Mackine 101	cocoamidopropyl dimethylamine
C148	EXP-158	experimental nonionic C_{12} PO(4.8) EO(4.7)
C149	EXP-114	experimental nonionic C_{12-16} PO(4.1) EO(7.8)
C150	Ethomeen C15	PEG 2 cocoamine
C151	Ethomeen C20	PEG 10 cocoamne
C152	Isopar V (Exxon)	paraffinic solvent
C154	AV 01/63-3 (Clariant)	tallowamine ethoxylate EO(15)
C155	Ammonium oxalate	

C156	Witcamine 302 (Witco)	PEG 2 cocamine
C157	Witcamine 410 (Witco)	PEG 10 tallow amine

Example 1

The stability of a 477 g a.e./L potassium glyphosate solution was evaluated. 36.5% a.e. potassium glyphosate, 12% Witcamine TAM 80 (C109), 5% octylamine (C91) and water to 100% were combined at room temperature followed by mixing with a magnetic stir bar at about 50 °C until a homogeneous sample was produced. A single phase, clear solution was obtained at 50 °C and at room temperature. Stability was maintained during 3 days of cycling, over a 12 hour period, between -10 and 10 °C.

Example 2

The stability of a 523 g a.e./L potassium glyphosate solution was evaluated. 39.3% a.e. potassium glyphosate, 12% Witcamine TAM 80 (C109), 6% octylamine (C91) and water to 100% were combined at room temperature followed by mixing with a magnetic stir bar at about 50 °C until a homogeneous sample was produced. A single phase, clear solution was obtained at 50 °C and at room temperature. Stability was maintained during 3 days of cycling, over a 12 hour period, between -10 and 10 °C.

Example 3

The stability of a 477 g a.e./L potassium glyphosate solution was evaluated. 36.5% a.e. potassium glyphosate, 12% Witcamine TAM 105 (C110), 5% octylamine (C91) and water to 100% were combined at room temperature followed by mixing with a magnetic stir bar at about 50 °C until a homogeneous sample was produced. A single phase, clear solution was obtained at 50 °C and at room temperature.

Examples 4-6

In examples 4-6 the stability of high load potassium glyphosate formulations were evaluated for formulations with varying surfactant and octylamine

concentrations. The formulation components were combined at room temperature followed by mixing with a magnetic stir bar at about 50 °C until a homogeneous sample was produced. Unless otherwise indicated, the formulations were evaluated at 50 °C and room temperature. A "clear" result indicates a transparent single phase solution was obtained. A "cloudy" result indicates a cloudy single phase solution was obtained. A "fail" result indicates phase separation occurred.

Example 4

Stabilizer compatibility evaluation of composition trial 526 comprising 37.4% a.e. (about 490 g a.e./L) potassium glyphosate, 6.0% EMCOL CC-40 (Surf), 0-6.0% Octylamine (Stab) and water to 100%.

Run	A7Y	B3C	C2I	D0L	E8M
Surf.	C40	C40	C40	C40	C40
wt%	12.0	12.0	12.0	12.0	12.0
Stab.	C91	C91	C91	C91	C91
wt%	2.0	3.0	5.0	5.0	6.0
50 °C	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy
RT	Fail	Fail	Fail	Fail	Cloudy

Example 5

Stabilizer compatibility evaluation of composition trial 527 comprising 37.4% a.e. (about 490 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and octylamine stabilizer (Stab.) components.

Run	A0P	B4H	C3S	D7U	E3X	F0L	G7Y	H3B
Surf. 1	C110	C109	C110	C109	C110	C109	C110	C109
wt%	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0
Surf. 2	C27	C27	C46	C46	C5	C5	C5	C5
wt%	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5.0	5.0	5.0	5.0	5.0	5.0	6.0	6.0
50 °C	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy
RT	Fail	Fail	Clear	Clear	Cloudy	Cloudy	Clear	Clear

Example 6

Stabilizer compatibility evaluation of composition trial 528 comprising 37.4% a.e. (about 490 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and octylamine stabilizer (Stab.) components.

Run	A2Z	B5V	C0B	D6M	E4G	F9L	G3C
Surf. 1	C110	C109	C110	C110	C109	C40	C40
wt%	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Surf. 2	C46	C46	C5	C5	C5	C46	C5
wt%	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	5.0	5.0	5.0	7.0	7.0	6.0	6.0
50 °C	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy
RT	Cloudy	Cloudy	Clear	Clear	Clear	-----	------

Examples 7-14

In examples 7-14 the stability of high load potassium glyphosate formulations were evaluated for formulations with varying compatibilization and short chain length alkyl amine concentrations. The formulation components were combined at room temperature followed by mixing with a magnetic stir bar at about 50 °C until a homogeneous sample was produced. Unless otherwise indicated, the formulations were evaluated overnight at high temperature (about 50 °C), room temperature, 10 °C, 0 °C and -10 °C. Additionally, a -10 °C sample was evaluated after one week. A "clear" result indicates a transparent single phase solution was obtained. A "cloudy" result indicates a cloudy single phase solution was obtained. A "fail" result indicates phase separation occurred.

Example 7

480 g a.e./l potassium glyphosate, 4.92% TAM 80, 7.38% Emulgin-L, 0-3.0% Isopar L compatiblizer (Stab.), 0-6.0% Hexylamine (Amine), and Water to 100%

Run	Stab.	Amine	HT	RT	10 °C	0 °C	-10 °C	-10 °C (1 wk)
908W1L	0%	3.0%	Clear	Clear	Clear	Clear	Fail	Fail
908Z3D	3.0%	2.0%	Cloudy	Fail	Fail	Fail	Fail	Fail
908O9F	1.0%	4.0%	Clear	Clear	Clear	Clear	Fail	Fail
908J6B	0%	6.0%	Clear	Clear	Clear	Cloudy	Cloudy	Cloudy
908E4K	0%	4.0%	Clear	Clear	Clear	Cloudy	Cloudy	Fail
908K9R	2.25%	1.5%	Cloudy	Fail	Fail	Fail	Fail	Fail
908E2D	1.5%	0%	Fail	Fail	Fail	Fail	Fail	Fail
908F6X	0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
908G5T	2.25%	4.5%	Cloudy	Cloudy	Cloudy	Cloudy	Fail	Fail
908H0A	3.0%	6.0%	Cloudy	Cloudy	Cloudy	Cloudy	Fail	Fail
908I8J	3.0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
908J2M	1.5%	6.0%	Clear	Cloudy	Cloudy	Fail	Fail	Fail
908K7G	0.75%	1.5%	Fail	Fail	Fail	Fail	Fail	Fail
908L9L	3.0%	3.0%	Cloudy	Fail	Fail	Fail	Fail	Fail
908M6S	1.7%	2.7%	Clear	Cloudy	Cloudy	Fail	Fail	Fail

Example 8

480 g a.e./l potassium glyphosate, 4.92% TAM 80, 7.38% Emulgin-L, 0-3.0% Isopar L stabilizer (Stab.), 0-6.0% Octylamine (Amine), and Water to 100%

Run	Stab.	Amine	HT	RT	10 °C	0 °C	-10 °C	-10 °C (1 wk)
909A4V	0%	3.0%	Clear	Clear	Clear	Clear	Fail	Fail
909B5H	3.0%	2.0%	Cloudy	Fail	Fail	Fail	Fail	Fail
909C6B	1.0%	4.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
909D2I	0%	6.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
909E3C	0%	4.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
909F3P	2.25%	1.5%	Cloudy	Fail	Fail	Fail	Fail	Fail
909G1T	1.5%	0%	Fail	Fail	Fail	Fail	Fail	Fail
909H9M	0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
909I4B	2.25%	4.5%	Clear	Clear	Clear	Clear	Cloudy	Fail
909J8O	3.0%	6.0%	Clear	Clear	Clear	Clear	Fail	Fail
909K6J	3.0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
909L6S	1.5%	6.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
909M2K	0.75%	1.5%	Fail	Fail	Fail	Fail	Fail	Fail
909N0K	3.0%	3.0%	Cloudy	Cloudy	Fail	Cloudy	Fail	Fail
909O7E	1.7%	2.7%	Clear	Clear	Clear	Clear	Fail	Fail

Example 9

480 g a.e./l potassium glyphosate, 4.92% TAM 80, 7.38% Emulgin-L, 0-3.0% Isopar L stabilizer (Stab.), 0-6.0% Decylamine (Amine), and Water to 100%

Run	Stab.	Amine	HT	RT	10 °C	0 °C	-10 °C	-10 °C (1 wk)
910A2C	0%	3.0%	Fail	Fail	Fail	Fail	Fail	Fail
910B6T	3.0%	2.0%	Fail	Fail	Fail	Fail	Fail	Fail
910C7B	1.0%	4.0%	Fail	Fail	Fail	Fail	Fail	Fail
910D1U	0%	6.0%	Fail	Fail	Fail	Fail	Fail	Fail
910E0P	0%	4.0%	Fail	Fail	Fail	Fail	Fail	Fail
910F6A	2.25%	1.5%	Fail	Fail	Fail	Fail	Fail	Fail
910G9K	1.5%	0%	Fail	Fail	Fail	Fail	Fail	Fail
910H6Z	0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
910I7W	2.25%	4.5%	Fail	Fail	Fail	Fail	Fail	Fail
910J1W	3.0%	6.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
910K8B	3.0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
910L2Y	1.5%	6.0%	Cloudy	Clear	Clear	Clear	Cloudy	Cloudy
910M8L	0.75%	1.5%	Fail	Fail	Fail	Fail	Fail	Fail
910N0E	3.0%	3.0%	Fail	Fail	Fail	Fail	Fail	Fail
910O3G	1.7%	2.7%	Fail	Fail	Fail	Fail	Fail	Fail

Example 10

480 g a.e./l potassium glyphosate, 4.92% TAM 80, 7.38% Emulgin-L, 0-3.0% Isopar L stabilizer (Stab), 0-6.0% Dodecylamine (Amine), and Water to 100%

Run	Stab.	Amine	HT	RT	10 °C	0 °C	-10 °C	-10 °C (1 wk)
911A3K	0%	3.0%	Fail	Fail	Fail	Fail	Fail	Fail
911B6H	3.0%	2.0%	Fail	Fail	Fail	Fail	Fail	Fail
911C3K	1.0%	4.0%	Fail	Fail	Fail	Fail	Fail	Fail
911D4F	0%	6.0%	Fail	Fail	Fail	Fail	Fail	Fail
911E0I	0%	4.0%	Fail	Fail	Fail	Fail	Fail	Fail
911F9H	2.25%	1.5%	Fail	Fail	Fail	Fail	Fail	Fail
911G5V	1.5%	0%	Fail	Fail	Fail	Fail	Fail	Fail
911H7J	0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
911I8S	2.25%	4.5%	Fail	Fail	Fail	Fail	Fail	Fail
911J4K	3.0%	6.0%	Fail	Fail	Fail	Fail	Fail	Fail
911K2P	3.0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
911L6G	1.5%	6.0%	Fail	Fail	Fail	Fail	Fail	Fail
911M1P	0.75%	1.5%	Fail	Fail	Fail	Fail	Fail	Fail
911N5Q	3.0%	3.0%	Fail	Fail	Fail	Fail	Fail	Fail
911O8Z	1.7%	2.7%	Fail	Fail	Fail	Fail	Fail	Fail

Example 11

480 g a.e./l potassium glyphosate, 4.92% TAM 80, 7.38% Emulgin-L, 0-3.0% Aromatic 150 stabilizer (Stab.), 0-6.0% Octylamine (Amine), and Water to 100%

Run	Stab.	Amine	HT	RT	0 °C	-10 °C	-10 °C (1 wk)	-20 °C (5 wks)
912A6J	0%	3.0%	Clear	Clear	Clear	Fail	Fail	Fail
912B8V	3.0%	2.0%	Fail	Fail	Fail	Fail	Fail	Fail
912C3D	1.0%	4.0%	Clear	Clear	Clear	Cloudy	Cloudy	Fail
912D5J	0%	6.0%	Clear	Clear	Clear	Cloudy	Cloudy	Fail
912E0Q	0%	4.0%	Clear	Clear	Clear	Cloudy	Cloudy	Fail
912F7H	2.25%	1.5%	Fail	Fail	Fail	Fail	Fail	Fail
912G4D	1.5%	0%	Fail	Fail	Fail	Fail	Fail	Fail
912H8K	0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
912I3W	2.25%	4.5%	Clear	Clear	Clear	Cloudy	Cloudy	Cloudy
912J9K	3.0%	6.0%	Clear	Clear	Clear	Clear	Clear	Cloudy
912K2Z	3.0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
912L6Q	1.5%	6.0%	Clear	Clear	Clear	Cloudy	Cloudy	Fail
912M2A	0.75%	1.5%	Fail	Fail	Fail	Fail	Fail	Fail
912N7T	3.0%	3.0%	Clear	Clear	Clear	Clear	Clear	Cloudy
912O4B	1.7%	2.7%	Clear	Clear	Clear	Clear	Cloudy	Fail

Example 12

480 g a.e./l potassium glyphosate, 4.92% TAM 45, 7.38% Emulgin-L, 0-3.0% Isopar L stabilizer (Stab.), 0-6.0% Octylamine (amine), and Water to 100%

Run	Stab.	Amine	HT	RT	10 °C	0 °C	-10 °C	-10 °C (1 wk)
913A7R	0%	3.0%	Clear	Clear	Clear	Clear	Fail	Fail
913B3E	3.0%	2.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
913C4P	1.0%	4.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
913D8R	0%	6.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
913E4B	0%	4.0%	Clear	Clear	Clear	Clear	Cloudy	Fail
913F0S	2.25%	1.5%	Clear	Clear	Clear	Clear	Fail	Fail
913G1A	1.5%	0%	Fail	Fail	Fail	Fail	Fail	Fail
913H3M	0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
913I5V	2.25%	4.5%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
913E2I	3.0%	6.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
913I8M	3.0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
913T6V	1.5%	6.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
913J7N	0.75%	1.5%	Clear	Clear	Clear	Clear	Fail	Fail
913P2Z	3.0%	3.0%	Clear	Clear	Clear	Clear	Clear	Fail
913U5V	1.7%	2.7%	Clear	Clear	Clear	Clear	Cloudy	Fail

Example 13

480 g a.e./l potassium glyphosate, 4.92% TAM 45, 7.38% Emulgin-L, 0-3.0% Aromatic 150 stabilizer (Stab.), 0-6.0% Octylamine (Amine), and Water to 100%

Run	Stab.	Amine	HT	RT	10 °C	0 °C	-10 °C	-10 °C (1 wk)
914A2C	0%	3.0%	Clear	Clear	Clear	Clear	Fail	Fail
914B7H	3.0%	2.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
914C3S	1.0%	4.0%	Clear	Clear	Clear	Clear	Cloudy	Fail
914D7N	0%	6.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
914E4H	0%	4.0%	Clear	Clear	Clear	Clear	Cloudy	Fail
914F8F	2.25%	1.5%	Fail	Fail	Clear	Clear	Cloudy	Cloudy
914G3O	1.5%	0%	Fail	Fail	Fail	Fail	Fail	Fail
914H1P	0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
914I2W	2.25%	4.5%	Clear	Clear	Clear	Clear	Clear	Cloudy
914J6C	3.0%	6.0%	Clear	Clear	Clear	Clear	Clear	Cloudy
914K9A	3.0%	0%	Fail	Fail	Fail	Fail	Fail	Fail
914L2T	1.5%	6.0%	Clear	Clear	Clear	Clear	Cloudy	Cloudy
914M4D	0.75%	1.5%	Clear	Clear	Clear	Clear	Fail	Fail
914N9L	3.0%	3.0%	Clear	Clear	Clear	Clear	Clear	Cloudy
914O3X	1.7%	2.7%	Clear	Clear	Clear	Clear	Cloudy	Cloudy

Example 14

37% (about 480 g a.e./L) potassium glyphosate, Emulgen-L (Surf. 1), TAM 60 (Surf. 2) or TAM 80 (Surf. 2 - Run 915A3W), octylamine (Stab. 1), Aromatic 150 (Stab. 2), and Water to 100%.

Run	Surf. 1	Surf. 2	Stab. 1	Stab. 2	-10 °C (1 wk)	-20 °C (6 wks)
915A3W	2.46%	3.69%	1.5%	1.54%	Clear	Fail
915B8J	2.44%	3.69%	1.51%	1.51%	Clear	Fail
915C6Z	-----	4.61%	1.01%	-----	Clear	Clear
915D0L	-----	5.29%	0.99%	-----	Clear	Clear
915E5T	-----	6.13%	1.02%	-----	Clear	Clear
915F9K	-----	4.66%	2%	-----	Clear	Clear
915G6N	-----	5.25%	2%	-----	Clear	Clear
915H3U	-----	7.35%	1.02%	-----	Clear	Fail
915I8D	-----	9%	1.1%	-----	Clear	Fail
915J6W	-----	4.63%	-----	-----	Clear	Fail
915K9B	-----	8.19%	1%	-----	Clear	Clear

Examples 15-151

In examples 15-151 the stability of high load glyphosate formulations were evaluated for formulations with varying compatibilization and short chain length alkyl amine concentrations. Unless otherwise indicated the potassium salt of glyphosate was evaluated. The formulation components were combined at room temperature followed by mixing with a magnetic stir bar at about 60 °C until a homogeneous sample was produced. Unless otherwise noted, the formulations were evaluated at high temperature (about 60 °C) and overnight at the indicated temperatures. A sample that failed was not further tested at lower temperatures. A "clear" result indicates a transparent single phase solution was obtained. A "cloudy" result indicates a cloudy single phase solution was obtained. A "fail" result indicates phase separation or solidification occurred.

Example 15

Stabilizer compatibility evaluation of composition trial 101 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3D	B7Y	C4R	D9W	E2F	F1M	G6K	H6Y
Surf. 1	C46	C46	C46	C27	C27	C46	C46	C46
wt%	4.8	4.8	4.8	4.8	4.8	4.9	4.9	4.9
Surf. 2	C40	C40	C40	C109	C109	C40	C40	C40
wt%	7.2	7.2	7.2	7.2	7.2	7.4	7.4	7.4
Stab.	C74	C92	C92	C74	C74	C74	C74	C74
wt%	6	6	6	5	5	3	5	7
60 °C	Clear	Clear	Fail	Fail	Fail	Fail	Fail	Fail
RT	Clear	Fail	No test	No test	No test	No test	No test	No test
10 °C	Clear	No test	No test	No test	No test	No test	No test	No test

Example 16

Stabilizer compatibility evaluation of composition trial 104 comprising 31% a.e. (about 370 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and octylamine stabilizer (Stab.) components.

Run	A6Y	B2W	C6H	D0M	E1S	F5F	G8K	H5B
Surf. 1	C16	C17	C18	C18	C20	C21	C22	C23
wt%	4	4	4	4	4	4	4	4
Surf. 2	C109	C109	C109	C109	C109	C109	C109	C109
wt%	6	6	6	6	6	6	6	6
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	6	6	6	6	6	6	6	6
60 °C	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
RT	Clear	Fail	Fail	Fail	Fail	Fail	Fail	Fail
10 °C	Fail	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 17

Stabilizer compatibility evaluation of composition trial 106 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3E	B9L	C3C	D3W	E8K
Surf. 1	C27	C27	C27	C27	C27
wt%	4.8	4.8	4.8	4.8	4.8
Surf. 2	C43	C43	C43	C43	C43
wt%	7.2	7.2	7.2	7.2	7.2
Stab.1	C15	C15	C15	C15	C15
wt%	3.3	5.2	1.7	5.2	1
Stab. 2	C30	C30	C30	C30	C30
wt%	8.3	5.5	2.1	10.6	6.8
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Fail	Clear	Clear	Clear
10 °C	Fail	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test	No test

Example 18

Stabilizer compatibility evaluation of composition trial 108 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and octylamine stabilizer (Stab.) components.

Run	A4J	B5T	C2W	D9O	E7G	F9K	G5N	H6R
Surf. 1	C46	C46	C46	C46	C46	C46	C110	C11
wt%	3.6	4.8	6	7.2	8.4	12	12	4.8
Surf. 2	C110	C110	C110	C110	C110	-----	-----	-----
wt%	8.4	7.2	6	4.8	3.6	-----	-----	-----
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5	5
60 °C	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Clear
10 °C	No test	No test	No test	No test	No test	No test	No test	Clear
0 °C	No test	No test	No test	No test	No test	No test	No test	Cloudy
0 °C*	No test	No test	No test	No test	No test	No test	No test	Cloudy

*@ 1 week

Example 19

Stabilizer compatibility evaluation of composition trial 110 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3C	B6K	C4F	D9L
Surf. 1	C46	C46	C46	C11
wt%	4.8	4.8	4.8	4.8
Surf. 2	C110	C110	C110	C110
wt%	7.2	7.2	7.2	7.2
Stab.	C91	C74	C85	C91
wt%	6	4	4	5
60 °C	Clear	Clear	Clear	Clear
RT	Clear	Clear	Fail	Clear
10 °C	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test

Example 20

Stabilizer compatibility evaluation of composition trial 112 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3S	B9F	C6G	D5K	E0P	F7H	G1C
Surf. 1	C46	C46	C46	C46	C46	C46	C120
wt%	3.6	4.8	6	7.2	8.4	12	12
Surf. 2	C121	C121	C121	C121	C121	-----	-----
wt%	8.4	7.2	6	4.8	3.6	-----	-----
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test

Example 21

Stabilizer compatibility evaluation of composition trial 114 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4V	B8K	C5F	D9L	E2B	F3S	G0B
Surf. 1	C5	C5	C5	C5	C5	C5	C110
wt%	3.6	4.8	6	7.2	8.4	12	12
Surf. 2	C110	C110	C110	C110	C110	-----	-----
wt%	8.4	7.2	6	4.8	3.6	-----	-----
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5
60 °C	Clear	Clear	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test

Example 22

Stabilizer compatibility evaluation of composition trial 116 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5T	B9J	C3S	D1W	E8H	F5X	G9Z
Surf. 1	C46	C46	C46	C46	C46	C46	C40
wt%	3.6	4.8	6	7.2	8.4	12	12
Surf. 2	C40	C40	C40	C40	C40	-----	-----
wt%	8.4	7.2	6	4.8	3.6	-----	-----
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5
60 °C	Clear	Clear	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test

Example 23

Stabilizer compatibility evaluation of composition trial 117 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6B	B4K	C5T	D9I	E2X
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C43	C43	C43	C43	C43
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C90	C38	C113	C85	C74
wt%	6	6	6	6	6
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Fail	Fail	Fail	Clear
10 °C	Clear	No test	No test	No test	Clear
0 °C	Cloudy	No test	No test	No test	Cloudy

Run	F6V	G5Q	H8N	I5X	J9P
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C43	C43	C43	C43	C43
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C78	C92	C117	C95	C36
wt%	6	6	6	6	6
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Fail	Clear	Fail	Fail	Fail
10 °C	No test	Fail	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Example 24

Stabilizer compatibility evaluation of composition trial 118 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4V	B6K	C3J	D0W	E6B
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C43	C43	C43	C43	C43
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C1	C25	C116	C118	C115
wt%	6	6	6	6	6
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail
10 °C	No Test	No test	No test	No test	No test
0 °C	No Test	No test	No test	No test	No test

Run	F2X	G7I	H9Q	I4T
Surf. 1	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9
Surf. 2	C43	C43	C43	C43
wt%	7.4	7.4	7.4	7.4
Stab.	C113	C119	C89	C88
wt%	6	6	6	6
60 °C	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Clear
10 °C	No Test	No test	No test	No test
0 °C	No Test	No test	No test	No test

Example 25

Stabilizer compatibility evaluation of composition trial 119 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4V	B6K	C3J	D0W	E6B
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C43	C43	C43	C43	C43
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C74	C92	C36	C91	C92
wt%	4	4	4	4	7
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Fail	Fail
10 °C	Fail	Fail	Fail	No test	No test
0 °C	No Test	No test	No test	No test	No test

Run	F2X	G7I	H9Q	I4T
Surf. 1	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9
Surf. 2	C43	C43	C43	C43
wt%	7.4	7.4	7.4	7.4
Stab.	C89	C78	C85	C74
wt%	7	7	7	5.5
60 °C	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Clear
10 °C	No test	No test	No test	Cloudy
0 °C	No test	No test	No test	Fail

Example 26

Stabilizer compatibility evaluation of composition trial 120 comprising 36.9% (about 480 g a.e./L) potassium glyphosate (Run A5R), 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate (all other runs) and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5R	B2W	C7V	D5T	E9P
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	C74	C74	C92	C92	C92
wt%	5.5	5.5	6	6	5
Stab. 2	C25	C25	C25	-----	-----
wt%	0.3	0.3	0.3	-----	-----
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear
10 °C	Fail	Fail	Clear	Clear	Clear
0 °C	No test	No test	Fail	Fail	Clear

Example 27

Stabilizer compatibility evaluation of composition trial 122 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8N	B6K	C4L	D2M	E3A	F7C	G6Y
Surf. 1	C5	C5	C5	C5	C5	C5	C40
wt%	3.6	4.8	6	7.2	8.4	12	12
Surf. 2	C40	C40	C40	C40	C40	-----	-----
wt%	8.4	7.2	6	4.8	3.6	-----	-----
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Clear
RT	No test	No test	No test	No test	No test	No test	Fail
10 °C	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test

Example 28

Stabilizer compatibility evaluation of composition trial 124 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5N	B7U	C0P	D5J	E4W	F9K	G5V
Surf. 1	C11	C11	C11	C11	C11	C11	C110
wt%	3.6	4.8	6	7.2	8.4	12	12
Surf. 2	C110	C110	C110	C110	C110	-----	-----
wt%	8.4	7.2	6	4.8	3.6	-----	-----
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5
60 °C	Clear	Clear	Fail	Fail	Fail	Fail	Fail
RT	Clear	Clear	No test	No test	No test	No test	No test
10 °C	Clear	Clear	No test	No test	No test	No test	No test
0 °C	Fail	Fail	No test	No test	No test	No test	No test

Example 29

Stabilizer compatibility evaluation of composition trial 125 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9B	B6I	C4D	D2L	E2A
Surf. 1	C27	C27	C27	C27	C27
wt%	4.8	4.8	4.8	4.8	4.8
Surf. 2	C43	C43	C43	C43	C43
wt%	7.2	7.2	7.2	7.2	7.2
Stab.	C74	C92	C92	C92	C92
wt%	5.5	6	5	7	6
Other Add.	C32	-----	-----	-----	C15
wt%	0.3	-----	-----	-----	0.3
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear
10 °C	Fail	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test	No test

Example 30

Stabilizer compatibility evaluation of composition trial 126 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9L	B5Y	C3S	D8U	E1R
Surf. 1	C27	C27	C27	C46	C46
wt%	7.2	4.8	4.8	4.8	4.8
Surf. 2	C43	C43	C110	C43	C43
wt%	7.2	7.2	7.2	7.2	7.2
Stab.	C36	C74	C92	C92	C74
wt%	2.3	6	6	6	6
Other Add.	C15	C32	C32	-----	C32
wt%	3.3	0.3	0.3	-----	0.3
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear
10 °C	Fail	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test	No test

Example 31

Stabilizer compatibility evaluation of composition trial 127 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5G	B9K	C4M	D2X	E8O	F2W
Surf. 1	C27	C27	C27	C27	C27	C27
wt%	4	4	4	4	4	4
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	6	6	6	6	6	6
Stab.	C74	C74	C74	C74	C91	C38
wt%	3	4	5	6	5	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	Fail	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 32

Stabilizer compatibility evaluation of composition trial 128 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4P	B3D	C5G	D4H	E8J	F1V	G4X
Surf. 1	C5	C5	C27	C46	C46	C46	C46
wt%	4	4	4.8	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C42	C110	C110	C110	C110
wt%	6	6	7.2	7.4	7.4	7.4	7.4
Stab.	C74	C92	C74	C92	C92	C74	C74
wt%	6	6	6	3	4	3	6
60 °C	Clear	Clear	Clear	Fail	Clear	Clear	Clear
RT	Clear	Clear	Clear	No test	Clear	Clear	Clear
10 °C	Cloudy	Fail	Fail	No test	Clear	Clear	Clear
0 °C	Cloudy	No test	No test	No test	Fail	Cloudy	Cloudy

Example 33

Stabilizer compatibility evaluation of composition trial 129 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6H	B4F	C9K	D3M	E1S
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C74	C74	C92	C92	C91
wt%	2	1	2	1	1
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear
10 °C	Clear	Clear	Clear	Clear	Clear
0 °C	Fail	Fail	Fail	Fail	Fail

Run	F0L	G5N	H3Z	I6F	J2U
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	-----
wt%	2	3	4	5	-----
60 °C	Clear	Clear	Clear	Clear	Fail
RT	Clear	Clear	Clear	Clear	No test
10 °C	Clear	Clear	Clear	Clear	No test
0 °C	Clear	Clear	Clear	Clear	No test

Example 34

Stabilizer compatibility evaluation of composition trial 130 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8M	B6H	C0S	D1J	E3X	F5G	G4K	H7V
Surf. 1	C27	C27	C46	C46	C46	C46	C46	C46
wt%	4	4	4.8	4.8	4.8	4.8	4.8	4.8
Surf. 2	C43	C43	C121	C121	C110	C110	C40	C40
wt%	6	6	7.2	7.2	7.2	7.2	7.2	7.2
Stab.	C91	C74	C91	C74	C91	C91	C91	C92
wt%	6	6	6	6	5	4	6	6
60 °C	Fail	Fail	Fail	Clear	Fail	Fail	Clear	Fail
RT	No test	No test	No test	Clear	No test	No test	Clear	No test
10 °C	No test	No test	No test	Clear	No test	No test	Clear	No test
0 °C	No test	No test	No test	Cloudy	No test	No test	Fail	No test

Example 35

Stabilizer compatibility evaluation of composition trial 131 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4F	B7J	C7L	D1A	E7N	F5O
Surf. 1	C11	C11	C5	C5	C5	C5
wt%	4.8	4.8	4.8	4.8	4.8	4.8
Surf. 2	C110	C110	C110	C110	C40	C40
wt%	7.2	7.2	7.2	7.2	7.2	7.2
Stab.	C91	C92	C92	C91	C91	C92
wt%	6	6	6	6	6	6
60 °C	Fail	Fail	Fail	Fail	Clear	Fail
RT	No test	No test	No test	No test	Clear	No test
10 °C	No test	No test	No test	No test	Cloudy	No test
0 °C	No test	No test	No test	No test	Cloudy	No test

Example 36

Stabilizer compatibility evaluation of composition trial 133 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A0B	B5K	C2P	D6G	E1Z	F7U	G9A	H4D
Surf. 1	C27	C27	C46	C46	C46	C46	C27	C46
wt%	4.8	4.8	4.8	4.9	4.9	4.8	4.9	4.8
Surf. 2	C43	C43	C43	C110	C110	C110	C43	C40
wt%	7.2	7.2	7.2	7.4	7.4	7.2	7.4	7.2
Stab.	C92	C74	C92	C92	C92	C91	C91	C74
wt%	7	5.5	6	6	1	6	6	6
60 °C	Fail	Fail	Fail	Fail	Clear	Clear	Clear	Clear
RT	No test	No test	No test	No test	Fail	Clear	Clear	Fail
10 °C	No test	No test	No test	No test	No test	Fail	Fail	No test
0 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 37

Stabilizer compatibility evaluation of composition trial 134 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6V	B7U	C0S	D3N	E9L	F1X	G6J	H8M
Surf. 1	C27	C27	C27	C27	C46	C46	C46	C46
wt%	4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Surf. 2	C110	C110	C110	C110	C110	C110	C110	C110
wt%	7.2	7.2	7.2	7.2	7.2	7.2	7.2	7.2
Stab.	C74	C91	C91	C74	C74	C74	C74	C91
wt%	6.5	6.5	4	4	3	5	7	3
60 °C	Clear	Clear	Clear	Clear	Clear	Fail	Clear	Fail
RT	Fail	Fail	Fail	Fail	Fail	No test	Clear	No test
10 °C	No test	No test	No test	No test	No test	No test	Fail	No test
0 °C	No test	No test	No test	No test	No test	No test	Fail	No test

Example 38

Stabilizer compatibility evaluation of composition trial 135 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3C	B9H	C4R	D0Z	E5M	F2W	G6B	H7U
Surf. 1	C27	C27	C46	C46	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.8	4.9	4.9	4.9
Surf. 2	C43	C43	C110	C110	C43	C43	C110	C110
wt%	7.4	7.4	7.4	7.4	7.2	7.4	7.4	7.4
Other	-----	-----	-----	-----	C114	C114	C114	C114
wt%	-----	-----	-----	-----	1	1	1	1
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Clear	Clear	Fail	Fail	Fail	Fail
10 °C	No test	No test	Fail	Fail	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 39

Stabilizer compatibility evaluation of composition trial 136 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8I	B4R	C3N	D9J	E1S	F0L	G4X	H3C
Surf. 1	C27	C27	C27	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.8	4.8	4.8	4.8	4.8	4.8
Surf. 2	C43	C43	C110	C110	C43	C43	C43	C43
wt%	7.4	7.4	7.2	7.2	7.2	7.2	7.2	7.2
Other	-----	-----	C114	C114	C114	C114	-----	-----
wt%	-----	-----	3	1.5	1.5	3	-----	-----
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	6	6	5	5	5	5	10	12
60 °C	Clear	Clear	Clear	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 40

Stabilizer compatibility evaluation of composition trial 137 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7H	B5T	C8K	D1L
Surf. 1	C27	C27	C27	C27
wt%	4.8	4.8	4.8	4.8
Surf. 2	C110	C110	C110	C110
wt%	7.2	7.2	7.2	7.2
Other	C114	C114	C77	C77
wt%	0.25	0.5	0.25	0.5
Stab.	C91	C91	C91	C91
wt%	3	3	3	3
60 °C	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test
0 °C	No test	No test	No test	No test

Example 41

Stabilizer compatibility evaluation of composition trial 138 comprising 36.5% a.e. (about 480 g a.e./L) (Run H0V @ 38% - about 513 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9J	B5D	C5K	D3X	E7U
Surf. 1	C46	C46	C46	C46	C46
wt%	5.8	5.8	5.8	5.8	5.8
Surf. 2	C110	C110	C110	C110	C110
wt%	8.8	8.8	8.8	8.8	8.8
Stab.	C91	C74	C91	C91	C91
wt%	7	7	8.5	6.5	7
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Run	F1P	G4B	H0V	I8P
Surf. 1	C46	C46	C46	C46
wt%	5.8	5.8	5.8	5.8
Surf. 2	C110	C110	C110	C110
wt%	8.8	8.8	8.8	8.8
Stab.	C91	C91	C91	C91
wt%	7.5	8.5	9	9
60 °C	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test
10 °C	No test	No test	No test	No test
0 °C	No test	No test	No test	No test

Example 42

Stabilizer compatibility evaluation of composition trial 139 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5L	B2S	C7H
Surf. 1	C46	C46	C46
wt%	4.9	4.9	4.9
Surf. 2	C110	C110	C110
wt%	7.4	7.4	7.4
Stab.	C91	C91	C91
wt%	5	5	5
60 °C	Fail	Fail	Fail
RT	No test	No test	No test
10 °C	No test	No test	No test
0 °C	No test	No test	No test

Example 43

Stabilizer compatibility evaluation of composition trial 140 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A0P	B6F	C4Z	D2W	E7K
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	C38	C38	C38	C38	C91
wt%	0.5	1	0.5	1	0.5
Stab. 2	-----	-----	C91	C91	-----
wt%	-----	-----	1	1	-----
60 °C	Fail	Fail	Clear	Fail	Clear
RT	No test	No test	Clear	No test	Clear
10 °C	No test	No test	Clear	No test	Clear
0 °C	No test	No test	Fail	No test	Fail

Run	F6G	G9B	H2V	I5S
Surf. 1	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4
Stab 1.	C91	C91	C91	C30
wt%	1	1	1	0.5
Stab. 2	-----	C30	C30	-----
wt%	-----	0.5	1	-----
60 °C	Clear	Clear	Clear	Clear
RT	Clear	Fail	Clear	Clear
10 °C	Clear	No test	Fail	Fail
0 °C	Fail	No test	No test	No test

Example 44

Stabilizer compatibility evaluation of composition trial 141 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7J	B6G	C4L	D0S	E7N
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	5	6	7	8	9
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear
10 °C	Fail	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test	No test

Run	F4B	G6W	H9L	I1V
Surf. 1	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91
wt%	10	4	3	2
60 °C	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear
10 °C	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test

Example 45

Stabilizer compatibility evaluation of composition trial 143 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3W	B3P	C7Y	D5J	E0C
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	2	4	6	8	10
60 °C	Clear	Cloudy	Cloudy	Clear	Clear
RT	Clear	Fail	Fail	Clear	Clear
10 °C	Fail	No test	No test	Cloudy	Cloudy
0 °C	No test	No test	No test	Fail	Fail

Example 46

Stabilizer compatibility evaluation of composition trial 144 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6U	B1X	C6Y	D2P	E8H
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C40	C40	C40	C40	C40
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	2	4	6	8	10
60 °C	Fail	Clear	Clear	Clear	Clear
RT	No test	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Example 47

Stabilizer compatibility evaluation of composition trial 145 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3E	B0K	C4V	D1Q	E3T
Surf. 1	C11	C11	C11	C11	C11
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C40	C40	C40	C40	C40
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	2	4	6	8	10
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Example 48

Stabilizer compatibility evaluation of composition trial 146 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3E	B0K	C4V	D1Q	E3T
Surf. 1	C11	C11	C11	C11	C11
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	2	4	6	8	10
60 °C	Cloudy	Fail	Clear	Clear	Clear
RT	Fail	No test	Clear	Clear	Clear
10 °C	No test	No test	Fail	Fail	Fail
0 °C	No test	No test	No test	No test	No test

Example 49

Stabilizer compatibility evaluation of composition trial 147 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5F	B9I	C2S	D6G	E8V
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C40	C40	C40	C40	C40
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	2	4	6	8	10
60 °C	Clear	Cloudy	Cloudy	Clear	Clear
RT	Cloudy	Fail	Clear	Clear	Clear
10 °C	Fail	No test	Fail	Fail	Fail
0 °C	No test	No test	No test	No test	No test

Example 50

Stabilizer compatibility evaluation of composition trial 148 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6H	B2Z	C7J	D0R	E3D
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C41	C41	C41	C41	C41
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	2	4	6	8	10
60 °C	Clear	Fail	Fail	Clear	Clear
RT	Clear	Fail	Fail	Clear	Clear
10 °C	Fail	Cloudy	Cloudy	Fail	Fail
0 °C	No test	Fail	Fail	No test	Fail

Example 51

Stabilizer compatibility evaluation of composition trial 149 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2D	B0O	C4V	D2B	E7Q
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	2	4	6	8	10
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear
10 °C	Clear	Clear	Clear	Clear	Clear
0 °C	Fail	Fail	Fail	Fail	Fail

Example 52

Stabilizer compatibility evaluation of composition trial 150 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4R	B9K	C2A
Surf. 1	C46	C46	C46
wt%	4.9	4.9	4.9
Surf. 2	C110	C110	C110
wt%	7.4	7.4	7.4
Stab.	C30	C30	C30
wt%	1	2	3
60 °C	Clear	Clear	Clear
RT	Fail	Fail	Fail
10 °C	No test	No test	No test
0 °C	No test	No test	No test

Example 53

Stabilizer compatibility evaluation of composition trial 151 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A1T	B5S	C3G	D9L	E8E	F5H
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	4.8	4.8	4.8	4.8	4.8	4.8
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	7.2	7.2	7.2	7.2	7.2	7.2
Stab. 1	C91	C91	C91	C91	C91	C91
wt%	1	2	3	4	5	6
Stab. 2	-----	-----	-----	-----	-----	-----
wt%	-----	-----	-----	-----	-----	-----
60 °C	Clear	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear	Clear
10 °C	Fail	Fail	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test	No test	No test

Run	G3K	H7R	I5B	J0Z	K5Q
Surf. 1	C46	C46	C46	C46	C46
wt%	4.8	4.8	4.8	4.8	4.8
Surf. 2	C110	C110	C110	C110	C110
wt%	7.2	7.2	7.2	7.2	7.2
Stab. 1	C91	C91	C91	C91	C91
wt%	7	8	1	1	1
Stab. 2	-----	-----	C30	C30	C30
wt%	-----	-----	1	2	3
60 °C	Clear	Clear	Fail	Fail	Fail
RT	Clear	Clear	No test	No test	No test
10 °C	Fail	Fail	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Example 54

Stabilizer compatibility evaluation of composition trial 152 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5N	B5L	C2U	D9Y	E6H	F0S
Surf. 1	C27	C27	C27	C27	C27	C27
wt%	4	4	4	4	4	4
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	6	6	6	6	6	6
Stab.	C91	C91	C91	C91	C91	C91
wt%	1	2	3	4	5	6
60 °C	Clear	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear	Clear
10 °C	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy
0 °C	Fail	Fail	Fail	Fail	Fail	Fail

Example 55

Stabilizer compatibility evaluation of composition trial 153 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7Y	B2D	C2C	D7J	E9O	F7Y
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	4.8	4.8	4.8	4.8	4.8	4.8
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	7.2	7.2	7.2	7.2	7.2	7.2
Stab.	C92	C92	C92	C92	C92	C92
wt%	1	2	3	4	5	6
60 °C	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy	Cloudy
RT	Fail	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 56

Stabilizer compatibility evaluation of composition trial 154 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2T	B1Q	C9K	D5L	E7W	F7K
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	4.8	4.8	4.8	4.8	4.8	4.8
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	7.2	7.2	7.2	7.2	7.2	7.2
Stab.	C76	C76	C76	C76	C76	C76
wt%	1	2	3	4	5	6
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 57

Stabilizer compatibility evaluation of composition trial 155 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6T	B2U	C3V
Surf. 1	C46	C46	C46
wt%	4.9	4.9	4.9
Surf. 2	C110	C110	C110
wt%	7.4	7.4	7.4
Stab. 1	C91	C91	C91
wt%	6.5	6.5	6.5
Stab. 2	C114	C44	C75
wt%	6.8	6.82	6.8
60 °C	Clear	Clear	Clear
RT	Fail	Fail	Fail
10 °C	No test	No test	No test
0 °C	No test	No test	No test

Example 58

Stabilizer compatibility evaluation of composition trial 156 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3P	B2X	C9Y	D5N	E7B
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	1	2	3	4	5
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Run	F1Z	G8M	H5C	I9K	J4F
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91
wt%	6	7	8	9	10
60 °C	Clear	Fail	Fail	Fail	Fail
RT	Fail	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Example 59

Stabilizer compatibility evaluation of composition trial 157 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7U	B2S	C8J	D4F	E0A
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C92	C92	C92	C92	C92
wt%	2	4	6	8	10
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Fail	Clear	Clear	Clear	Clear
10 °C	No test	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test	No test

Example 60

Stabilizer compatibility evaluation of composition trial 158 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7U	B2S	C8J	D4F	E0A
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C76	C76	C76	C76	C76
wt%	2	4	6	8	10
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Example 61

Stabilizer compatibility evaluation of composition trial 159 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7U	B2S	C8J	D4F	E0A
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C74	C74	C74	C74	C74
wt%	2	4	6	8	10
60 °C	Clear	Clear	Clear	Clear	Clear
RT	Fail	Clear	Clear	Fail	Fail
10 °C	No test	Fail	Fail	No test	No test
0 °C	No test	No test	No test	No test	No test

Example 62

Stabilizer compatibility evaluation of composition trial 160 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5V	B9K	C2A	D5X	E0L	F6Y	G2R	H7P
Surf. 1	C46	C46	C27	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.8	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.2	7.4	7.4	7.4	7.4	7.4
Stab.	C85	C85	C85	C85	C85	C85	C85	-----
wt%	0.25	0.5	1	2	3	4	5	-----
60 °C	Clear	Clear	Clear	Clear	Cloudy	Cloudy	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 63

Stabilizer compatibility evaluation of composition trial 161 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5F	B2H	C5W	D9N	E8A	F7E	G4G
Surf. 1	C46	C46	C27	C46	C46	C46	C46
wt%	4.9	4.9	4.8	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.2	7.4	7.4	7.4	7.4
Stab. 1	C91	C91	C91	C91	C91	C91	C91
wt%	1	1	1	1	2	3	4
Stab. 2	C74	C74	C74	C74	C74	C74	C74
wt%	1	2	3	4	1	1	1
60 °C	Clear	Clear	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Clear	Clear	Fail	Fail	Clear
10 °C	No test	No test	Fail	Fail	No test	No test	Fail
0 °C	No test	No test	Fail	Fail	No test	No test	No test

Example 64

Stabilizer compatibility evaluation of composition trial 163 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and stabilizer (Stab.) components with no added surfactant.

Run	A2Z	B4U	C0N	D8D	E2D	F1B
Stab.	C87	C73	C93	C96	C26	C80
wt%	2	3	3	3	3	3
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Run	G8S	H1P	I5R	J8D	K5V	L3R
Stab.	C7	C32	C120	C80	C103	C104
wt%	3	3	3	3	3	3
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 65

Stabilizer compatibility evaluation of composition trial 164 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6T	B2U	C3V	D7U
Surf. 1	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C109
wt%	7.4	7.4	7.4	7.4
Stab. 1	C74	C74	C74	C74
wt%	3	5	7	6.5
60 °C	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear
10 °C	Fail	Fail	Fail	Fail
0 °C	No test	No test	No test	No test

Example 66

Stabilizer compatibility evaluation of composition trial 165 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3S	B6G	C1K	D7P	E4R	F0B
Surf. 1	C46	C16	C17	C18	C21	C5
wt%	4.9	4.9	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C109	C109	C109	C109
wt%	7.4	7.4	7.4	7.4	7.4	7.4
Stab.	C74	C74	C74	C74	C74	C74
wt%	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Clear	Clear	Clear	Clear	Clear	Clear
RT	Fail	Fail	Fail	Fail	Fail	Fail
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 67

Stabilizer compatibility evaluation of composition trial 167 comprising 5% a.e. (about 480 g a.e./L) potassium glyphosate and stabilizer (Stab.) components with no added surfactant.

Run	A6G	B2Q	C9K	D7N	E3T	F0J
Stab.	C87	C73	C93	C96	C26	C80
wt%	2	2	2	2	2	2
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Run	G3X	H7R	I2Y	J0L	K1E	L5V
Stab.	C7	C32	C120	C80	C103	C104
wt%	2	2	2	2	2	2
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 68

Stabilizer compatibility evaluation of composition trial 175 comprising 5% a.e. (about 480 g a.e./L) potassium glyphosate and stabilizer (Stab.) components with no added surfactant.

Run	A3F	B8J	C0S	D2M	E8W	F8R
Stab.	C93	C82	C2	C111	C34	C34
wt%	0.3	0.3	0.3	0.3	0.3	0.3
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 69

Stabilizer compatibility evaluation of composition trials 176 (A3D) and 178 comprising 36.9% a.e. potassium glyphosate (about 480 g a.e./L) and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3D	A2P	B4X	C9K	D1B	E7R	F3B	G5V
Surf. 1	C46	C79	C79	C79	C79	C79	C79	C110
wt%	4.9	3	4	5	6	7	10	10
Surf. 2	C110	C110	C110	C110	C110	C110	-----	-----
wt%	7.4	7	6	5	4	3	-----	-----
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 70

Stabilizer compatibility evaluation of composition trial 180 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7H	B2L	C3Q	D9K	E6N	F7K
Surf. 1	C79	C79	C79	C79	C5	C5
wt%	4	5	4	5	4	4
Surf. 2	C110	C110	C48	C48	C110	C48
wt%	6	5	6	5	6	6
Stab.	C91	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 71

Stabilizer compatibility evaluation of composition trial 182 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5T	B3U	C2W	D9C	E1A	F6X
Surf. 1	C79	C5	C27	C79	C5	C27
wt%	4.9	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C48	C48	C48
wt%	7.4	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 72

Stabilizer compatibility evaluation of composition trial 184 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9I	B5V	C5K	D0P	E3Z	F5N	G4L
Surf. 1	C27	C27	C46	C5	C79	C48	C3
wt%	4.9	4.9	4.9	4.9	4.9	4.9	12.3
Surf. 2	C3	C3	C3	C3	C3	C3	-----
wt%	7.4	7.4	7.4	7.4	7.4	7.4	-----
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test	No test

Example 73

Stabilizer compatibility evaluation of composition trial 185 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2H	B6G	C1A	D9P	E5T
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	C91	C91	C91	C91	-----
wt%	4	3	2	3	-----
Stab. 2	-----	C47	C47	C47	C47
wt%	-----	1	2	1	4
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Run	F7N	G3D	H8K	I8J
Surf. 1	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4
Stab. 1	C91	C91	C91	C91
wt%	3	4	5	6
Stab. 2	C47	C47	C47	-----
wt%	3	2	1	-----
60 °C	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test
10 °C	No test	No test	No test	No test
0 °C	No test	No test	No test	No test

Example 74

Stabilizer compatibility evaluation of composition trial 186 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3R	B1W	C1N	D8G	E3S	F9T
Surf. 1	C5	C5	C5	C5	C5	C5
wt%	4.9	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91	C91
wt%	0	2	4	6	8	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 75

Stabilizer compatibility evaluation of composition trial 187 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8H	B9P	C6F	D0S	E2A	F5D
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4	7.4
Stab. 1	C45	C91	C91	C91	C91	C91
wt%	6	1	2	3	4	5
Stab. 2	-----	C45	C45	C45	C45	C45
wt%	-----	5	4	3	2	1
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 76

Stabilizer compatibility evaluation of composition trial 188 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7U	B2S	C8N	D4G	E1W	F2V
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4	7.4
Stab. 1	C98	C91	C91	C97	C91	C91
wt%	6	2	4	6	2	4
Stab. 2	-----	C98	C98	-----	C97	C97
wt%	-----	4	2	-----	4	2
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test	No test

Example 77

Stabilizer compatibility evaluation of composition trial 189 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7K	B1P	C3Z	D0R	E3K
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	C99	C91	C91	C100	C91
wt%	6	2	4	6	2
Stab. 2	-----	C99	C99	-----	C100
wt%	-----	4	2	-----	4
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Run	F2C	G7J	H4F	I5N
Surf. 1	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4
Stab. 1	C91	C101	C91	C91
wt%	4	6	2	4
Stab. 2	C100	-----	C101	C101
wt%	2	-----	4	2
60 °C	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test
10 °C	No test	No test	No test	No test
0 °C	No test	No test	No test	No test

Example 78

Stabilizer compatibility evaluation of composition trial 190 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2S	B6B	C9K	D5L	E2Z
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	C83	C91	C91	C24	C91
wt%	6	2	4	6	2
Stab. 2	-----	C83	C83	-----	C24
wt%	-----	4	2	-----	4
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Run	F0F	G5B	H3K	I1Z
Surf. 1	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4
Stab. 1	C91	C13	C91	C91
wt%	4	6	2	4
Stab. 2	C24	-----	C13	C13
wt%	2	-----	4	2
60 °C	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test
10 °C	No test	No test	No test	No test
0 °C	No test	No test	No test	No test

Example 79

Stabilizer compatibility evaluation of composition trial 191 comprising 36.7% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7H	B9W	C5N	D3M	E1J
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	C72	C91	C91	C102	C91
wt%	6	2	4	6	2
Stab. 2	-----	C72	C72	-----	102
wt%	-----	4	2	-----	4
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
10 °C	No test	No test	No test	No test	No test
0 °C	No test	No test	No test	No test	No test

Run	F8V	G3K	H2A	I0E
Surf. 1	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4
Stab. 1	C91	C84	C91	C91
wt%	4	6	2	4
Stab. 2	C102	-----	C84	C84
wt%	2	-----	4	2
60 °C	Clear	Fail	Fail	Fail
RT	Clear	No test	No test	No test
10 °C	No test	No test	No test	No test
0 °C	No test	No test	No test	No test

Example 80

Stabilizer compatibility evaluation of composition trial 721 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9K	B3C	C5M	D2Z	E0L	F1A
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	2.5	3.7	6.2	7.4	8.6	9.8
Surf. 2	C109	C109	C109	C109	C109	C109
wt%	9.8	8.6	6.2	4.9	3.7	2.5
Stab.	C91	C91	C91	C91	C91	C91
wt%	4	4	4	4	4	4
60 °C	Clear	Clear	Fail	Fail	Fail	Cloudy
RT	Clear	Clear	Fail	Fail	Fail	Cloudy
-10 °C	Cloudy	Fail	Fail	Fail	Fail	Cloudy

Example 81

Stabilizer compatibility evaluation of composition trial 722 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6B	B2U	C9L	D1Z	E3K	F0R
Surf.	C109	C109	C109	C109	C109	C109
wt%	9.2	10.6	12.3	9.2	10.6	12.3
Stab.	C91	C91	C91	C91	C91	C91
wt%	4	4	4	6	6	6
60 °C	Clear	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear	Clear
-10 °C	Clear	Clear	Clear	Clear	Clear	Clear
-10 °C*	Clear	Clear	Clear	Clear	Clear	Clear

- @ 4 Weeks

Example 82

Stabilizer compatibility evaluation of composition trial 723 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7J	B4P	C2B	D8M	E3I	F0V
Surf.	C110	C110	C110	C110	C110	C110
wt%	9.2	10.6	12.3	9.2	10.6	12.3
Stab.	C91	C91	C91	C91	C91	C91
wt%	4	4	4	6	6	6
60 °C	Clear	Fail	Fail	Clear	Clear	Clear
RT	Clear	No test	No test	Clear	Clear	Clear
-10 °C	Clear	No test	No test	Clear	Clear	Clear
-10 °C*	Clear	No test	No test	Clear	Clear	Fail

@ 4 Weeks

Example 83

Stabilizer compatibility evaluation of composition trial 724 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7J	B4P	C2B	D8M	E3I	F0V
Surf.	C43	C43	C43	C43	C43	C43
wt%	9.2	10.6	12.3	9.2	10.6	12.3
Stab.	C91	C91	C91	C91	C91	C91
wt%	4	4	4	6	6	6
60 °C	Fail	Fail	Fail	Clear	Fail	Fail
RT	No test	No test	No test	Clear	No test	No test
-10 °C	No test	No test	No test	Fail	No test	No test

Example 84

Stabilizer compatibility evaluation of composition trial 725 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2S	B9K	C5N	D3C	E6H	F4A
Surf.	C106	C106	C106	C106	C106	C106
wt%	9.2	10.6	12.3	9.2	10.6	12.3
Stab.	C91	C91	C91	C91	C91	C91
wt%	4	4	4	6	6	6
60 °C	Clear	Fail	Fail	Clear	Clear	Fail
RT	Clear	No test	No test	Clear	Clear	No test
-10 °C	Clear	No test	No test	Clear	Clear	No test
-10 °C*	Clear	No test	No test	Clear	Clear	No test

*4 weeks

Example 85

Stabilizer compatibility evaluation of composition trial 726 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8N	B3C	C1L	D0Q	E6G
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C109	C109	C109
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	-----
wt%	4	3	2	1	-----
60 °C	Clear	Fail	Fail	Fail	Fail
RT	Clear	No test	No test	No test	No test
-10 °C	Clear	No test	No test	No test	No test

Example 86

Stabilizer compatibility evaluation of composition trial 727 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7Y	B3L	C2Z	D9B
Surf. 1	C109	C109	C109	C109
wt%	12.3	12.3	12.3	12.3
Stab.	C91	C91	C91	-----
wt%	3	2	1	-----
60 °C	Clear	Fail	Fail	Fail
RT	Clear	No test	No test	No test
-10 °C	Clear	No test	No test	No test
-10 °C*	Clear	No test	No test	No test

* @ 4 Weeks

Example 87

Stabilizer compatibility evaluation of composition trial 728 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2E	B3A	C5C	D0L	E2N	F8T	G4N	H6B
Surf. 1	C46	C46	C46	C46	C46	C46	C46	C46
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C110	C110	C110	C110
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	3	3	3	3	4	4	4	4
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 88

Stabilizer compatibility evaluation of composition trial 729 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4C	B9O	C3F	D6B	E7L	F2S	G7B	H0W
Surf. 1	C46	C46	C46	C46	C46	C46	C46	C46
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C110	C110	C110	C110	C43	C43	C43	C43
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	6	6	6	6
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 89

Stabilizer compatibility evaluation of composition trial 730 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7T	B3F	C2P	D9L	E5N	F0B	G7R	H4E
Surf. 1	C46	C46	C46	C46	C46	C46	C46	C46
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C106	C106	C106	C106	C109	C109	C109	C109
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5	5
60 °C	Fail	Fail	Fail	Fail	Clear	Clear	Clear	Clear
RT	No test	No test	No test	No test	Clear	Clear	Clear	Clear
-10 °C	No test	No test	No test	No test	Clear	Cloudy	Cloudy	Cloudy

Example 90

Stabilizer compatibility evaluation of composition trial 731 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7T	B3F	C2P	D9L	E5N	F0B	G7R	H4E
Surf. 1	C5	C5	C5	C5	C5	C5	C5	C5
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C110	C110	C110	C110
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5	5
60 °C	Clear	Cloudy	Cloudy	Cloudy	Clear	Fail	Fail	Fail
RT	Clear	Fail	Fail	Fail	Clear	No test	No test	No test
-10 °C	Cloudy	No test	No test	No test	Cloudy	No test	No test	No test

Example 91

Stabilizer compatibility evaluation of composition trial 732 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4R	B6T	C0S	D0M	E2X	F4K	G1A	H3Y
Surf. 1	C79	C79	C79	C79	C5	C5	C5	C5
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C110	C110	C110	C110
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5	5
60 °C	Clear	Fail	Fail	Fail	Clear	Fail	Fail	Fail
RT	Clear	No test	No test	No test	Clear	No test	No test	No test
-10 °C	Cloudy	No test	No test	No test	Cloudy	No test	No test	No test

Example 92

Stabilizer compatibility evaluation of composition trial 733 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9G	B3M	C7K	D2W	E1J	F9T	G0S	H7J
Surf. 1	C5	C5	C5	C5	C79	C79	C79	C79
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C109	C109	C109	C109
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	3	3	3	3	3	3	3	3
60 °C	Clear	Cloudy	Fail	Fail	Cloudy	Fail	Fail	Fail
RT	Clear	Fail	No test	No test	Fail	No test	No test	No test
-10 °C	Cloudy	No test	No test	No test	No test	No test	No test	No test

Example 93

Stabilizer compatibility evaluation of composition trial 734 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5R	B8V	C0A	D7F	E4H	F3Y	G9X	H5U
Surf. 1	C5	C5	C5	C5	C11	C11	C11	C11
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C109	C109	C109	C109
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	1	1	1	1	3	3	3	3
60 °C	Fail	Fail	Fail	Fail	Clear	Clear	Cloudy	Cloudy
RT	No test	No test	No test	No test	Clear	Clear	Fail	Fail
-10 °C	No test	No test	No test	No test	Clear	Clear	No test	No test

Example 94

Stabilizer compatibility evaluation of composition trial 735 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9K	B2J	C8X	D7Q	E8L	F2V
Surf. 1	C42	C42	C42	C42	C42	C42
wt%	9.2	10.6	12.3	9.2	10.6	12.3
Stab.	C91	C91	C91	C91	C91	C91
wt%	6	6	6	4	4	4
60 °C	Clear	Clear	Clear	Clear	Clear	Clear
RT	Clear	Clear	Clear	Clear	Clear	Clear
-10 °C	Clear	Clear	Clear	Clear	Clear	Clear
-10 °C*	Clear	Clear	Clear	Clear	Clear	Clear

* @ 4 Weeks

Example 95

Stabilizer compatibility evaluation of composition trial 736 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4F	B7M	C1A	D5K	E0R	F8E	G5H	H3B
Surf. 1	C5	C5	C5	C5	C11	C11	C11	C11
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C109	C109	C109	C109
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	2	2	2	2	2	2	2	2
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 96

Stabilizer compatibility evaluation of composition trial 737 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4F	B7M	C1A	D5K	E0R	F8E	G5H	H3B
Surf. 1	C11	C11	C11	C11	C11	C11	C11	C11
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C110	C110	C110	C110
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	4	4	4	4	4	4	4	4
60 °C	Clear	Clear	Clear	Cloudy	Fail	Fail	Fail	Fail
RT	Clear	Clear	Clear	Fail	No test	No test	No test	No test
-10 °C	Cloudy	Fail	Fail	No test	No test	No test	No test	No test

Example 97

Stabilizer compatibility evaluation of composition trial 738 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8M	B3E	C9K	D1S	E5Z	F8J
Surf. 1	C109	C109	C109	C42	C42	C42
wt%	9.2	10.6	12.3	9.2	10.6	12.3
Stab.	C91	C91	C91	C91	C91	C91
wt%	2	2	2	2	2	2
60 °C	Clear	Clear	Fail	Clear	Clear	Clear
RT	Clear	Clear	Fail	Clear	Clear	Clear
-10 °C	Clear	Clear	Fail	Clear	Clear	Fail
-10 °C*	Fail	Fail	No test	Clear	Fail	No test

* @ 4 Weeks

Example 98

Stabilizer compatibility evaluation of composition trial 739 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4F	B7M	C1A	D5K	E0R	F8E	G5H	H3B
Surf. 1	C11	C11	C11	C11	C11	C11	C11	C11
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C43	C43	C43	C43	C42	C42	C42	C42
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	4	4	4	4	4	4	4	4
60 °C	Fail	Fail	Fail	Fail	Clear	Clear	Clear	Fail
RT	No test	No test	No test	No test	Clear	Clear	Clear	No test
-10 °C	No test	No test	No test	No test	Clear	Clear	Clear	No test

Example 99

Stabilizer compatibility evaluation of composition trial 740 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8J	B1X	C5T	D4V	E9K	F4G	G2W	H0C
Surf. 1	C46	C46	C46	C46	C11	C11	C11	C11
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C42	C42	C42	C42	C43	C43	C43	C43
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	4	4	4	4	4	4	4	4
60 °C	Clear	Clear	Cloudy	Cloudy	Fail	Fail	Fail	Fail
RT	Clear	Clear	Fail	Fail	No test	No test	No test	No test
-10 °C	Clear	Clear	No test	No test	No test	No test	No test	No test
-10 °C*	Clear	Fail	No test	No test	No test	No test	No test	No test

* @ 4 Weeks

Example 100

Stabilizer compatibility evaluation of composition trial 741 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2V	B8J	C3D	D9K	E2Y	F0I
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C109	C109	C109	C109
wt%	7.4	7.4	7.4	7.4	7.4	7.4
Surf. 3	C112	C112	C33	C33	C71	C71
wt%	0.1	1	0.1	1	0.1	1
Stab.	C91	C91	C91	C91	C91	C91
wt%	2	2	2	2	2	2
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test

Example 101

Stabilizer compatibility evaluation of composition trial 742 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A0W	B6G	C2X	D7N	E7Z	F0L	G4J	H3C
Surf. 1	C11	C11	C11	C11	C11	C11	C11	C11
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C42	C42	C42	C42
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5	5
60 °C	Clear	Clear	Clear	Cloudy	Clear	Clear	Clear	Cloudy
RT	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 102

Stabilizer compatibility evaluation of composition trial 743 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A0W	B6G	C2X	D7N	E7Z	F0L	G4J	H3C
Surf. 1	C22	C22	C22	C22	C22	C22	C22	C22
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C42	C42	C42	C42
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 103

Stabilizer compatibility evaluation of composition trial 744 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6B	B3G	C1P	D7Y	E4N	F8J	G3U	H2V
Surf. 1	C21	C21	C21	C21	C21	C21	C21	C21
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C42	C42	C42	C42
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 104

Stabilizer compatibility evaluation of composition trial 745 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A1W	B5G	C8K	D0L	E8H	F5R	G3Z	H1A
Surf. 1	C17	C17	C17	C17	C17	C17	C17	C17
wt%	1.2	2.5	3.7	4.9	1.2	2.5	3.7	4.9
Surf. 2	C109	C109	C109	C109	C42	C42	C42	C42
wt%	11.1	9.8	8.6	7.4	11.1	9.8	8.6	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91	C91
wt%	5	5	5	5	5	5	5	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 105

Stabilizer compatibility evaluation of composition trial 747 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3C	B7H	C9S	D4L	E0K	F3G
Surf. 1	C46	C46	C46	C63	C62	C60
wt%	4.9	4.9	4.9	12.3	12.3	12.3
Surf. 2	C63	C62	C60	-----	-----	-----
wt%	7.4	7.4	7.4	-----	-----	-----
Stab.	C91	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test

Example 106

Stabilizer compatibility evaluation of composition trial 749 comprising 5% a.e. (about 480 g a.e./L) potassium glyphosate and the listed stabilizer components.

Run	A7U	B3C	C4F	D7H	E3M	F9K	G8F
Surf.	C93	C96	C26	C7	C6	C94	C82
wt%	2	2	2	2	2	2	2
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test

Example 107

Stabilizer compatibility evaluation of composition trial 751 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7B	B2N	C2Z	D9R	E7P	F3M	G2W
Surf.	C27	C28	C46	C86	C86	C27	C28
wt%	4.9	4.9	4.9	4.9	4.9	12.3	12.3
Stab.	C30	C30	C30	C110	C30	-----	-----
wt%	7.4	7.4	7.4	7.4	7.4	-----	-----
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test

Example 108

Stabilizer compatibility evaluation of composition trial 753 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8H	B2O	C8L	D4E	E9S	F3V	G5Q	H6B
Surf.	C27	C27	C27	C27	C27	C5	C5	C5
wt%	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Stab.	C30	C90	C37	C38	C9	C30	C90	C37
wt%	7.4	7.4	7.4	7.4	7.4	7.4	7.4	7.4
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 109

Compatibility evaluation of composition trial 755 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5G	B1M	C9S	D9W	E4R	F2D	G0V
Surf. 1	C27	C46	C86	C86	C86	C81	C81
wt%	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Surf. 2	-----	C109	C110	C109	-----	C109	C110
wt%	-----	7.4	7.4	7.4	-----	7.4	7.4
Stab.	C30	-----	-----	-----	C30	-----	-----
wt%	7.4	-----	-----	-----	7.4	-----	-----
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test

Example 110

Compatibility evaluation of composition trial 757 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5G	B1M	C9S	D9W	E4R
Surf. 1	C27	C46	C86	C81	C5
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C109	C109	-----
wt%	7.4	7.4	7.4	7.4	-----
Stab.	-----	-----	-----	-----	C30
wt%	-----	-----	-----	-----	7.4
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 111

Stabilizer compatibility evaluation of composition trial 759 comprising 31% a.e. (about 370 g a.e./L) glyphosate salt as indicated, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7U	B3N	BX4F	C7P	D3B	E0T	F8M
Gly Salt	IPA	MA	MA	MEA	NH_4	TMS	NPA
Surf. 1	C46	C46	C46	C46	C46	C46	C46
wt%	4	4	4	4	4	4	4
Surf. 2	C110	C110	C109	C110	C110	C110	C110
wt%	6	6	6	6	6	6	6
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test

Example 112

Stabilizer compatibility evaluation of composition trial 761 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A8F	B4O
Surf. 1	C21	C27
wt%	4.9	4.9
Surf. 2	C109	C63
wt%	7.4	7.4
Stab.	C74	C74
wt%	6.5	6.5
60 °C	Fail	Fail
RT	No test	No test
-10 °C	No test	No test

Example 113

Stabilizer compatibility evaluation of composition trial 762 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9A	B7H	C4Y	D9Q	E3C
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	3.7	4.9	4.9	4.9
Surf. 2	C109	C109	-----	-----	-----
wt%	7.4	7.4	-----	-----	-----
Stab.	C9	C9	C9	C91	C8
wt%	7	7	7.4	7.4	7.4
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 114

Stabilizer compatibility evaluation of composition trial 763 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5T	B1I	C3Z	D2S	E8N	F6W
Surf.	C27	C27	C27	C27	C27	C27
wt%	9.2	7.4	6.2	4.6	10.6	12.3
Stab.	C9	C9	C9	C9	C9	C9
wt%	6	6	6	6	6	6
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test

Example 115

Stabilizer compatibility evaluation of composition trial 764 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4E	B2L	C7Y	D0Q	E4V	F1R
Surf. 1	C46	C27	C46	C46	C27	C46
wt%	4.9	4.9	4.9	4	4	4
Surf. 2	C109	C43	C110	C109	C43	C110
wt%	7.4	7.4	7.4	6	6	6
Stab.	C9	C9	C9	C9	C9	C9
wt%	6	6	6	6	6	6
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test

Example 116

Stabilizer compatibility evaluation of composition trial 765 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9K	B3D	C5G	D1B	E5W
Surf.	C109	C109	C109	C28	C28
wt%	9.2	10.6	12.3	12.3	10
Stab.	C9	C9	C9	C9	C9
wt%	2	2	2	10	6
60 °C	Clear	Fail	Fail	Fail	Fail
RT	Clear	No test	No test	No test	No test
-10 °C	Clear	No test	No test	No test	No test
-10 °C*	Clear	No test	No test	No test	No test

* @ 4 Weeks

Example 117

Stabilizer compatibility evaluation of composition trial 767 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.).

Run	A4V	B7H	C0A	D4N	E4T
Surf. 1	C27	C27	C27	C27	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C30	C30	C30	C30	C30
wt%	7.4	4.1	7.4	4.1	7.4
Stab.	C91	C91	C9	C9	C14
wt%	2.7	6	2.7	6	2.7
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Run	F6J	G4X	H1L	I9E	J3C
Surf. 1	C27	C17	C17	C17	C17
wt%	4.9	3.7	4.9	3.7	4.9
Surf. 2	C30	C42	C42	C42	C42
wt%	7.4	8.6	7.4	8.6	7.4
Stab.	C14	C47	C47	C49	C49
wt%	6	2.7	6	2.7	6
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 118

Stabilizer compatibility evaluation of composition trial 768 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7T	B3N	C5W	D0A
Surf. 1	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9
Surf. 2	C30	C30	C30	C30
wt%	7.4	4.1	7.4	4.1
Stab.	C91	C91	C9	C9
wt%	2.7	6	2.7	6
60 °C	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test

Example 119

Stabilizer compatibility evaluation of composition trial 771 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A7T	B3N	C5W
Surf. 1	C109	C109	C109
wt%	12.3	10.6	9.2
Stab.	C9	C9	C9
wt%	3	3	3
60 °C	Fail	Fail	Clear
RT	No test	No test	Clear
-10 °C	No test	No test	Clear
-10 °C*	No test	No test	Clear

* @ 4 Weeks

Example 120

Stabilizer compatibility evaluation of composition trial 773 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.), Additive (Add.) and stabilizer (Stab.) components.

Run	A8J	B1C	C0H	D5V	E5W
Surf. 1	C46	C46	C46	C46	C46
wt%	3	3	3	3	3
Surf. 2	C109	C109	C109	C109	C109
wt%	7	7	7	7	7
Add.	C30	C30	C30	C30	C30
wt%	7.4	4.1	7.4	4.1	7.4
Stab.	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 121

Stabilizer compatibility evaluation of composition trial 775 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4L	B3P	C2L	D7U	E4V	F5G	G4T
Surf. 1	C110	C109	C5	C5	C21	C23	C46
wt%	12.3	12.3	4.9	4.9	4.9	4.9	4.9
Surf. 2	-----	-----	C109	C110	C109	C109	C110
wt%	-----	-----	7.4	7.4	7.4	7.4	7.4
Stab.	C91	C91	C91	C91	C91	C91	C91
wt%	6.5	6.5	6.5	6.5	6.5	6.5	6.5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test

Example 122

Stabilizer compatibility evaluation of composition trial 776 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3X	B0G	C0J	D6Y	E3F	F2S	G9O	H1B
Surf.	C86	C28	C86	C86	C86	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Stab.	C30	C30	C9	C38	C14	C9	C38	C9
wt%	6.3	6.3	7.4	7.4	7.4	7.4	7.4	7.4
60 °C	Fail	Fail	Fail	Fail	Fail	Clear	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 123

Stabilizer compatibility evaluation of composition trial 777 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9I	B2V	C4F	D2U	E7K
Surf. 1	C46	C46	C46	C46	C46
wt%	5.2	5.6	12.3	10.6	9.2
Surf. 2	C110	C110	-----	-----	-----
wt%	7.8	8.4	-----	-----	-----
Stab.	C92	C92	C9	C9	C9
wt%	1	1	4	4	4
60 °C	Clear	Clear	Fail	Fail	Fail
RT	Fail	Fail	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Run	F1A	G5D	H9K	I0H	J4Z
Surf. 1	C46	C46	C46	C46	C46
wt%	12.3	10.6	9.2	6.2	7.4
Surf. 2	-----	-----	-----	-----	-----
wt%	-----	-----	-----	-----	-----
Stab.	C9	C9	C9	C9	C9
wt%	6	6	6	6	5
60 °C	Fail	Fail	Fail	Clear	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 124

Stabilizer compatibility evaluation of composition trial 778 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5T	B1S	C7B	D4L	E8J	F6T
Surf.	C46	C27	C28	C86	C18	C18
wt%	4.9	4.9	4.9	4.9	4.9	4.9
Stab.	C9	C9	C9	C9	C9	C9
wt%	7.4	7.4	7.4	7.4	7.4	7.4
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test

Run	G0M	H7R	I7B	J3S	K1A
Surf.	C18	C20	C17	C16	C23
wt%	4.9	4.9	4.9	4.9	4.9
Stab.	C9	C9	C9	C9	C9
wt%	7.4	7.4	7.4	7.4	7.4
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 125

Stabilizer compatibility evaluation of composition trial 779 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2F	B8K	C1P	D4S
Surf.	C46	C46	C46	C46
wt%	5.6	6	6.4	5.2
Stab.	C9	C9	C9	C9
wt%	8.4	9	9.6	7.8
60 °C	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test

Example 126

Stabilizer compatibility evaluation of composition trial 780 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A2W	B0F	C4V	D3J	E9I
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C109	C110	C109
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C92	C92	C92	C91	C91
wt%	1	1.5	1	1	1
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Run	F6N	G4C	H2X	I8H
Surf. 1	C46	C46	C46	C46
wt%	4.9	4.9	3.1	3.1
Surf. 2	C110	C109	C110	C109
wt%	7.4	7.4	3.1	3.1
Stab.	C9	C9	-----	-----
wt%	1	1	-----	-----
60 °C	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test

Example 127

Stabilizer compatibility evaluation of composition trial 781 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.).

Run	A4C	B6Y	C9K	D5R	E2X	F8I	G3D
Surf 1.	C46	C46	C46	C46	C46	C46	C46
wt%	4.92	4.92	4.92	4.92	4.92	4.92	4.92
Surf. 2	C110	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4	7.4	7.4
Stab.	-----	C38	C38	C38	C15	C15	C15
wt%	-----	1	3	5	1	3	5
60 °C	Fail	Fail	Fail	Fail	Fail	Clear	Clear
RT	No test	No test	No test	No test	No test	Clear	Clear
-10 °C	No test	No test	No test	No test	No test	Clear	Clear
-10 °C*	No test	No test	No test	No test	No test	Clear	Clear

* @ 4 Weeks

Run	H7N	I3W	J7M	K8D	L1B	M6Y	N0F
Surf 1.	C46	C46	C46	C46	C46	C46	C46
wt%	4.92	4.92	4.92	4.92	4.92	4.92	4.92
Surf. 2	C110	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4	7.4	7.4
Stab.	C9	C9	C9	C77	C77	C77	C39
wt%	1	3	5	1	3	5	1
60 °C	Fail	Fail	Fail	Clear	Clear	Clear	Fail
RT	No test	No test	No test	Clear	Clear	Clear	No test
-10 °C	No test	No test	No test	Clear	Clear	Clear	No test
-10 °C*	No test	No test	No test	Clear	Fail	Fail	No test

* @ 4 Weeks

Run	O4G	P3E	Q7X	R9V	S2T	T7K	U4F
Surf 1.	C46	C46	C46	C46	C46	C46	C46
wt%	4.92	4.92	4.92	4.92	4.92	4.92	4.92
Surf. 2	C110	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4	7.4	7.4
Stab.	C39	C39	C122	C122	C122	C70	C70
wt%	3	5	1	3	5	1	3
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test

Run	V8F	W0R	X3G	Y9O	Z2F	AA8P	BB4E
Surf 1.	C46	C46	C46	C46	C46	C46	C46
wt%	4.92	4.92	4.92	4.92	4.92	4.92	4.92
Surf. 2	C110	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4	7.4	7.4
Stab.	C70	C37	C37	C37	C30	C30	C30
wt%	5	1	3	5	1	3	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test

Run	CC9H	DD1K	EE3S	FF7U	GG7J	HH2P
Surf 1.	C46	C46	C46	C46	C46	C46
wt%	4.92	4.92	4.92	4.92	4.92	4.92
Surf. 2	C110	C110	C110	C110	C110	C110
wt%	7.4	7.4	7.4	7.4	7.4	7.4
Stab.	C14	C14	C14	C10	C10	C10
wt%	1	3	5	1	3	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test

Example 128

Stabilizer compatibility evaluation of composition trial 782 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A4F	B7A	C2V	D0W	E3P
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C110	C110	C109	C109
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C77	C77	C77	-----	C77
wt%	1	3	5	-----	1
60 °C	Clear	Fail	Fail	Fail	Clear
RT	Clear	No test	No test	No test	Clear
-10 °C	Clear	No test	No test	No test	Clear
-10 °C*	Fail	No test	No test	No test	Cloudy

*@ 4 weeks

Run	F1K	G8S	H5K	I9T	J6B
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C109	C109	C109
wt%	7.4	7.4	7.4	7.4	7.4
Stab.	C77	C77	C9	C9	C9
wt%	3	5	1	3	5
60 °C	Clear	Fail	Fail	Fail	Fail
RT	Clear	No test	No test	No test	No test
-10 °C	Clear	No test	No test	No test	No test
-10 °C*	Fail	No test	No test	No test	No test

*@ 4 weeks

Example 129

Stabilizer compatibility evaluation of composition trial 783 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6Y	B0S	C8F	D9X	E4N
Surf.	C109	C109	C109	C110	C110
wt%	9.2	10.6	12.3	9.2	10.6
Stab.	C9	C9	C9	C9	C9
wt%	2	2	2	4	4
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Run	F0L	G3J	H2Q	I3B
Surf.	C110	C43	C43	C43
wt%	12.3	9.2	10.6	12.3
Stab.	C9	C9	C9	C9
wt%	4	6	6	6
60 °C	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test

Example 130

Stabilizer compatibility evaluation of composition trial 784 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9K	B3C	C2H	D7U	E2S	F5F	G5R	H2O
Surf. 1	C46	C46	C46	C46	C46	C46	C46	C46
wt%	1.2	2.6	3.7	4.9	1.2	2.6	3.7	4.9
Surf. 2	C42	C42	C42	C42	C42	C42	C42	C42
wt%	11.1	9.9	8.7	7.4	11.1	9.9	8.7	7.4
Stab.	C91	C91	C91	C91	C9	C9	C9	C9
wt%	5	5	5	5	5	5	5	5
60 °C	Clear	Clear	Clear	Clear	Fail	Fail	Fail	Fail
RT	Clear	Cloudy	Cloudy	Cloudy	No test	No test	No test	No test
-10 °C	Clear	Cloudy	Cloudy	Cloudy	No test	No test	No test	No test
-10 °C*	Clear	Fail	Fail	Fail	No test	No test	No test	No test

* @ 4 Weeks

Example 131

Stabilizer compatibility evaluation of composition trial 785 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A9L	B5V	C1U	D5B	E7Y	F5T
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	4	4	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C109	C109	C109	C109
wt%	6	6	7.4	7.4	7.4	7.4
Stab. 1	C91	C91	C91	C91	C91	C91
wt%	2	1	6	6	6	6
Stab. 2	C9	C9	-----	C77	C77	C77
wt%	4	4	-----	1	3	5
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test

Run	G7J	H2S	I8M	J3W	K0C
Surf. 1	C46	C46	C46	C46	C46
wt%	4	4	4	4	4
Surf. 2	C109	C109	C109	C109	C109
wt%	6	6	6	6	6
Stab. 1	C91	C91	C91	C91	C91
wt%	6	6	6	6	2
Stab. 2	-----	C77	C77	C77	C77
wt%	-----	1	3	5	1
60 °C	Fail	Clear	Fail	Fail	Fail
RT	Fail	Clear	No test	No test	No test
-10 °C	Fail	Clear	No test	No test	No test
-10 °C*	No test	Fail	No test	No test	No test

*@ 4 weeks

Example 132

Stabilizer compatibility evaluation of composition trial 786 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.).

Run	A5G	B2X	C6J	D7Q	E3H	F6U	G7W
Surf 1.	C46	C46	C46	C46	C46	C46	C46
wt%	5.6	5.6	4.3	5.6	4	4.4	4.8
Surf. 2	C110	C110	C110	C110	C110	C110	C110
wt%	8.4	8.4	6.5	8.4	6	6.5	7.3
Stab.	C77	-----	C77	C77	C77	C77	-----
wt%	0.7	-----	1.4	2	0.8	0.4	-----
60 °C	Fail	Fail	Clear	Clear	Clear	Fail	Fail
RT	Fail	Fail	Clear	Clear	Clear	No test	No test
-10 °C	Fail	Fail	Clear	Clear	Clear	No test	No test
-10 °C*	No test	No test	Fail	Fail	Cloudy	No test	No test

*@ 4 weeks

Run	H1M	I8L	J3S	K0J	L6P	M2V	N5G
Surf 1.	C46	C46	C46	C46	C46	C46	C46
wt%	4.6	4	4.1	4.5	4.8	5.1	5.1
Surf. 2	C110	C110	C110	C110	C110	C110	C110
wt%	7	6	6.1	6.8	7.2	7.7	7.7
Stab.	C77	C77	-----	C77	C77	C77	C77
wt%	0.8	2	-----	2	2	0.4	1.4
60 °C	Fail	Clear	Fail	Clear	Clear	Fail	Clear
RT	No test	Clear	No test	Clear	Clear	No test	Clear
-10 °C	No test	Clear	No test	Clear	Clear	No test	Clear

Run	O3U	P2B	Q6W
Surf 1.	C46	C46	C46
wt%	5.6	4.7	5.4
Surf. 2	C110	C110	C110
wt%	8.4	7	8.1
Stab.	C77	C77	C77
wt%	1.1	0.9	1
60 °C	Fail	Fail	Clear
RT	No test	No test	Clear
-10 °C	No test	No test	Cloudy

Example 133

Stabilizer compatibility evaluation of composition trial 787 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A6B	B9P	C1Z	D4M	E8Y	F3L	G5Q
Surf 1	C46	C46	C46	C46	C46	C46	C46
wt%	5.2	5.6	6	6.4	6.8	7.2	7.6
Surf. 2	C109	C109	C109	C109	C109	C109	C109
wt%	7.8	8.4	9	9.6	10.2	10.8	11.4
Stab.	-----	-----	-----	-----	-----	-----	-----
wt%	-----	-----	-----	-----	-----	-----	-----
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test

Run	H9K	I3R	J7S	K6A	L0B	M2C
Surf. 1	C46	C46	C46	C46	C46	C46
wt%	8	8.4	8.8	9.2	9.6	4.9
Surf. 2	C109	C109	C109	C109	C109	C110
wt%	12	12.6	13.2	13.8	14.4	7.4
Stab.	-----	-----	-----	-----	-----	C77
wt%	-----	-----	-----	-----	-----	1
60 °C	Fail	Fail	Fail	Fail	Fail	Clear
RT	No test	No test	No test	No test	No test	Clear
-10 °C	No test	No test	No test	No test	No test	Clear
-10 °C*	No test	No test	No test	No test	No test	Cloudy

*@ 4 weeks

Example 134

Stabilizer compatibility evaluation of composition trial 788 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3R	B2K	C9P	D5H	E5R	F1V	G9J
Surf 1	C46	C46	C46	C46	C46	C46	C46
wt%	5.2	5.6	6	6.4	6.8	7.2	7.6
Surf. 2	C110	C110	C110	C110	C110	C110	C110
wt%	7.8	8.4	9	9.6	10.2	10.8	11.4
Stab.	C77	C77	C77	C77	C77	C77	C77
wt%	1.5	1.5	1.5	1.5	1.5	1.5	1.5
60 °C	Clear	Clear	Clear	Fail	Fail	Fail	Fail
RT	Clear	Clear	Clear	No test	No test	No test	No test
-10 °C	Clear	Clear	Clear	No test	No test	No test	No test
-10 °C*	Fail	Cloudy	Fail	No test	No test	No test	No test

*@ 4 weeks

Run	H6M	I3U	J2X	K0W	L8B
Surf. 1	C46	C46	C46	C46	C46
wt%	8	8.4	8.8	9.2	9.6
Surf. 2	C110	C110	C110	C110	C110
wt%	12	12.6	13.2	13.8	14.4
Stab.	C77	C77	C77	C77	C77
wt%	1.5	1.5	1.5	1.5	1.5
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 135

Stabilizer compatibility evaluation of composition trial 789 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A3R	B2K	C9P	D5H	E5R	F1V	G9J
Surf 1	C46	C46	C27	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9	4.9	4.9
Surf. 2	C110	C109	C43	C109	-----	-----	C110
wt%	7.4	7.4	7.4	7.4	-----	-----	7.4
Stab. 1	C91	C91	C91	C91	C77	C77	C74
wt%	6	5	6	5	1	1	4
Stab. 2	C77	C77	C77	C77	C9	C91	C77
wt%	1	1	1	1	7.4	7.4	1
60 °C	Fail	Fail	Fail	Fail	Clear	Clear	Fail
RT	No test	No test	No test	No test	Clear	Clear	No test
-10 °C	No test	No test	No test	No test	Clear	Clear	No test
-10 °C	No test	No test	No test	No test	Fail	Fail	No test

*@ 4 weeks

Run	H6M	I3U	J2X	K0W	L8B
Surf. 1	C46	C27	C46	C46	C27
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C109	C43	C110	C109	C43
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	C74	C74	C92	C92	C92
wt%	4	6	4	4	5
Stab. 2	C77	C77	C77	C77	C77
wt%	1	1	1	1	1
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 136

Stabilizer compatibility evaluation of composition trial 790 comprising 36.9% A.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5T	B3O	C2X	D0H	E5B
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C109	C109	C109
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	-----	C9	C91	C91	C9
wt%	-----	3	4	3	6
Stab. 2	-----	-----	-----	C9	-----
wt%	-----	-----	-----	4	-----
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Run	F7T	G1B	H9K	I3G	J4N
Surf. 1	C46	C46	C46	C46	C46
wt%	4.9	4.9	4.9	4.9	4.9
Surf. 2	C109	C109	C109	C109	C109
wt%	7.4	7.4	7.4	7.4	7.4
Stab. 1	C91	C91	C91	C91	C91
wt%	1	2	3	6	1
Stab. 2	C9	C9	-----	-----	C9
wt%	5	1	-----	-----	1
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 137

Stabilizer compatibility evaluation of composition trial 791 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A0F	B6H	C4B	D5W	E1Z	F9V
Surf.	C27	C27	C27	C27	C27	C27
wt%	4.9	2.5	4	2	4	2
Stab. 1	C9	C9	C9	C9	C9	C9
wt%	7.4	9.8	6	8	6	8
Stab. 2	C77	C77	C77	C77	-----	-----
wt%	1	1	1	1	-----	-----
60 °C	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test

Run	G8J	H3V	I2K	J2F	K0M
Surf.	C27	C27	C27	C27	C27
wt%	2.5	4.9	2.5	4	2
Stab. 1	C9	C9	C9	C9	C9
wt%	9.8	7.4	9.8	6	8
Stab. 2	-----	C15	C15	C15	C15
wt%	-----	1	1	1	1
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 138

Stabilizer compatibility evaluation of composition trial 792 comprising 31% a.e. (about 370 g a.e./L) isopropylamine glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A0P	B4R	C7B	D8J	E1S	F8K	G0F	H3X
Surf. 1	C46	C46	C46	C46	C27	C27	C27	C27
wt%	4	4.6	4.8	5.6	4.9	4.9	4	4
Surf. 2	C110	C110	C110	C110	C9	C9	C9	C9
wt%	6	7	7.1	8.3	7.4	7.4	6	6
Stab.	C77	C77	C77	C77	-----	C77	-----	C77
wt%	1.4	1.7	1.5	1.8	-----	1	-----	1
60 °C	Clear	Clear	Clear	Fail	Fail	Fail	Fail	Clear
RT	Clear	Clear	Clear	No test	No test	No test	No test	Clear
-10 °C	Clear	Clear	Clear	No test	No test	No test	No test	Clear
-10 °C*	Cloudy	Cloudy	Cloudy	No test	No test	No test	No test	Clear

*@ 4 weeks

Example 139

Stabilizer compatibility evaluation of composition trial 793 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5T	B3O	C2X	D0H	E5B
Surf. 1	C27	C27	C46	C46	C46
wt%	4.9	4	1.6	1.6	1.6
Surf. 2	-----	-----	C110	C110	C110
wt%	-----	-----	2.4	2.4	2.4
Stab. 1	-----	C38	C38	C9	C9
wt%	-----	7.4	6	7.4	6
Stab. 2	-----	-----	-----	-----	C77
wt%	-----	-----	-----	-----	1
60 °C	Fail	Clear	Clear	Clear	Clear
RT	No test	Clear	Clear	Clear	Clear
-10 °C	No test	Fail	Clear	Clear	Clear
-10 °C*	No test	No test	Clear	Clear	Clear

* @4 Weeks

Run	F7T	G1B	H9K	I3G
Surf. 1	C46	C46	C46	C46
wt%	4.9	4	4.9	4
Surf. 2	C109	C109	C109	C109
wt%	7.4	7.4	7.4	7.4
Stab. 1	C91	C91	C9	C9
wt%	7.4	6	7.4	6
Stab. 2	-----	-----	-----	-----
wt%	-----	-----	-----	-----
60 °C	Clear	Clear	Fail	Fail
RT	Clear	Clear	No test	No test
-10 °C	Clear	Clear	No test	No test

Example 140

Stabilizer compatibility evaluation of composition trial 795 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A0P	B4R	C7B	D8J	E1S	F8K	G0F	H3X
Surf. 1	C27	C27	C27	C27	C27	C46	C46	C46
wt%	4.9	4	4	4	4.9	4.9	4.9	6.2
Surf. 2	C110	C110	C110	C110	C110	C110	C110	-----
wt%	7.4	6	6	6	7.4	7.4	7.4	-----
Stab.1	-----	-----	C91	C9	C91	C77	C91	C77
wt%	-----	-----	6	6	6	1	4	1
Stab.2	-----	-----	-----	-----	C77	-----	C77	-----
wt%	-----	-----	-----	-----	1	-----	1	-----
60 °C	Fail	Fail	Fail	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test	No test	No test	No test

Example 141

Stabilizer compatibility evaluation of composition trial 798 comprising 36.9% a.e. (about 480 g a.e./L) potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	A5T	B3O	C2X	D0H	E5B
Surf. 1	C46	C46	C46	C27	C27
wt%	6.3	7.4	9.8	3.7	3.7
Stab. 1	C91	C91	C91	C9	C9
wt%	6.3	4.9	2.5	8.6	8.6
Stab. 2	-----	-----	-----	-----	C77
wt%	-----	-----	-----	-----	1
60 °C	Fail	Fail	Fail	Fail	Fail
RT	No test	No test	No test	No test	No test
-10 °C	No test	No test	No test	No test	No test

Example 142

Stabilizer compatibility evaluation of composition trial 097 comprising 38% a.e. glyphosate IPA, and the listed surfactant (Surf.) and stabilizer (Stab.) components. "Stable" is defined as one phase.

Run	A4R	B9K	C4F	D2Z
Surf. 1	C11	C11	C132	C132
wt%	4	4	2	2
Surf. 2	C43	C43	C133	C133
wt%	6	7	2	2
Surf. 3	-----	-----	C43	C43
wt%	-----	-----	6	7
Stab. 1	C125	C125	C125	C125
wt%	1	1	1	1
50 °C	Stable	Stable	Fail	Fail
RT	Stable	Stable	Fail	Fail

Example 143

Stabilizer compatibility evaluation of composition trial 099 comprising 36.5% a.e. potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components. "Stable" is defined as one phase.

Run	A3X	B4F	C7G	D9S	E7L	F0P	G6B	H8M
Surf. 1	C11	C11	C133	C133	C134	C134	C135	C135
wt%	4	4	4	4	4	4	4	4
Surf. 2	C47	C47	C47	C47	C47	C47	C47	C47
wt%	7	9	7	9	7	9	7	9
Stab. 1	C14	C14	C14	C14	C14	C14	C14	C14
wt%	1	1	1	1	1	1	1	1
50 °C	Stable	Stable	Fail	Fail	Fail	Fail	Fail	Fail
RT	Stable	Stable	Fail	Fail	Fail	Fail	Fail	Fail

Example 144

Stabilizer compatibility evaluation of composition trial 100 comprising 38% a.e. glyphosate IPA, and the listed surfactant (Surf.) and stabilizer (Stab.) components. "Stable" is defined as one phase.

Run	A0L	B6V	C8N	D4X	E3S	F2H
Surf. 1	C11	C11	C11	C133	C133	C133
wt%	4	4	4	4	4	4
Surf. 2	C43	C43	C43	C43	C43	C43
wt%	6	6	7	6	6	7
Stab. 1	C125	-----	C125	C125	-----	C125
wt%	1	-----	1	1	-----	1
50 °C	Stable	Fail	Stable	Fail	Fail	Fail
RT*	Stable	Fail	Stable	Fail	Fail	Fail
0 °C*	Stable	Fail	Stable	Fail	Fail	Fail

*@ 1 week

Example 145

Stabilizer compatibility evaluation of composition trial 706 comprising 36.5% a.e. potassium glyphosate, and the listed surfactant (Surf.) and stabilizer (Stab.) components. "Stable" is defined as one phase.

Run	A0L	B6V	C8N	D4X	E3S	F2H
Surf. 1	C11	C11	C11	C132	C132	C132
wt%	4	4	4	4	4	4
Surf. 2	C43	C43	C43	C43	C43	C43
wt%	7	7	9	7	7	9
Stab. 1	C125	-----	C125	C125	-----	C125
wt%	1	-----	1	1	-----	1
50 °C	Stable	Fail	Stable	Fail	Fail	Fail
RT*	Stable	Fail	Stable	Fail	Fail	Fail
0 °C*	Stable	Fail	Stable	Fail	Fail	Fail

*@ 1 week

Example 146

The efficacy effect of stabilizers on glyphosate IPA salts with cationic and nonioic surfactants was evaluated. Aqueous compositions were prepared with as indicated in Example 146 Table a. The glyphosate concentrations for each composition was about 448 g a.e./liter. All components were added and then shaken to a uniform formulation. Each formulation was a stable, clear and dark yellow solution.

Example 146 Table a

Comp.	Comp. 1	% w/v	Comp. 2	% w/v	Comp. 3	%w/v	Comp. 4	%w/v
706A3M	C11	4	C43	7	C125	1	-----	-----
706B8U	C11	4	C136	7	C125	1	-----	-----
706C9K	C11	4	C137	7	C125	1	-----	-----
706D1S	C11	4	C43	7	C125	1	C138	0.5
706E8J	C11	4	C43	7	C125	1	C139	1
706F9V	C11	4	C43	7	C125	1	C140	1

The compositions of Example 146 Table a and comparative compositions of glyphosate IPA were applied to Velvetleaf (Abutilon theophrasti, ABUTH) plants. Results, averaged for all replicates of each treatment, are shown in Example 146 Table a.

Example 146 Table a ABUTH %inhibition

Composition	75 g a.e./ha	150 g a.e./ha	225 g a.e./ha	300 g a.e./ha
706A3M	55.8	80.2	91.8	96.2
706B8U	60	78.2	93.7	96.5
706C9K	57.5	81.3	93.2	95.8
706D1S	52.5	85.2	95.3	98.7
706E8J	65.8	80.5	94.3	98.5
706F9V	60	82.2	94.2	97
Composition 570I	20	58.3	72.2	79.3
Roundup Ultra	57.5	76.3	92	95.5
Composition IPA	63.3	81.3	95.5	97.7

The efficacy of formulations 706D1S, 706E8J and 706F9V was similar to the efficacy of the glyphosate standards.

Example 147

The efficacy effect of stabilizers on potassium glyphosate salts with cationic and nonioic surfactants was evaluated. Aqueous compositions were prepared with as indicated in Example 147 Table a. The glyphosate concentrations for each composition is indicated in g a.e./liter. All components were added and then shaken to a uniform formulation. Each formulation was a stable, clear and dark yellow solution.

Example 147 Table a

Comp.	[Gly]	Comp. 1	% w/v	Comp. 2	%w/v	Comp. 3	%w/v
750A3C	475	C11	4	C47	9	C14	1
750B8W	475	C11	5	C47	9	C14	1
750C3D	465	C11	6	C47	11	C14	2.5

The compositions of Example 147 Table a and comparative compositions of glyphosate IPA were applied to Velvetleaf (Abutilon theophrasti, ABUTH) plants. Results, averaged for all replicates of each treatment, are shown in Example 147 Table b.

Example 147 Table b ABUTH %inhibition

Composition	100 g a.e./ha	200 g a.e./ha	300 g a.e./ha	400 g a.e./ha
750A2X	38.2	69.2	79.4	92.4
750B9O	38.7	66.4	80.5	88.1
750C0W	57.3	75.1	85.8	91.3
Composition IPA	53	83.7	92.4	90.2
Roundup Ultra	49.3	72.7	89.1	90.8
Roundup UltraMax	60.3	78.8	87.9	90.8

The efficacy of formulation 750C0W was similar to the efficacy of the glyphosate standards.

Example 148

The efficacy effect of stabilizers on potassium glyphosate salts with cationic and nonioic surfactants was evaluated. Aqueous compositions were prepared with as indicated in Example 148 Table a. The glyphosate concentrations for each composition is indicated in g a.e./liter. All components were added and then shaken to a uniform formulation. Each formulation was a stable, clear and yellow solution.

Example 148 Table a

Comp.	[Gly]	Comp. 1	% w/v	Comp. 2	%w/v	Comp. 3	%w/v
774A3X	478	C11	4	C47	9	C14	1
774B7J	478	C11	4	C47	9	C14	1.3
774C0P	475	C11	4	C47	9	C14	1.5
774D3Q	478	C11	4	C47	9	C14/C138	1/2
774E9K	481	C11	4	C141	9	C125	2.5
774F7N	481	C11	4	C141	9	C14	2.5

The compositions of Example 148 Table a and comparative compositions of glyphosate IPA were applied to Velvetleaf (Abutilon theophrasti, ABUTH) plants. Results, averaged for all replicates of each treatment, are shown in Example 148 Table b. Application rates are given in g a.e./ha.

Example 148 Table b ABUTH %inhibition

Composition	75 g/ha	150 g/ha	225 g/ha	300 g/ha	375 g/ha
774A3X	24.2	61.7	78.3	85.8	95
69774B7J	22.5	70.8	84.2	90.8	96.3
774C0P	55.5	69.7	80	90.2	95.2
774D3Q	40	70	84.2	92.2	93.3
774E9K	29.2	70.8	88	93.3	95.3
774F7N	25.8	70	84.2	88.2	95.8
Composition 570I	1.7	25	54.2	66.7	78.8
Roundup Ultra	30.8	76	87	96.8	97

The efficacy of formulation 774C0P, 774D3Q and 774E9K was similar to the efficacy of the Roundup Ultra standard.

Example 149

The efficacy effect of stabilizers on glyphosate IPA salts with cationic and nonioic surfactants was evaluated. The glyphosate salt and concentration in g a.e./liter for each composition, and the remaining components are as indicated in Example 149 Table a.

Example 149 Table a

Comp.	Salt	[Gly]	Comp. 1	% w/v	Comp. 2	%w/v	Comp. 3	%w/v
033A7Y	IPA	360	C27	6.4	C43	9.6	C10*	1
033B3S	K	480	C46	4.9	C110	7.4	C72	6.5
033C9P	IPA	360	C142	2.2	C110	5.9	-----	-----
033D5V	K	473	C11	4	C121	9	C14	1
033E5G	IPA	360	C46	4.9	C110	7.4	C72	6.5
033F8L	K	480	C21	4.9	C109	7.4	C74	6.5
033G7N	K	480	C27	3.7	C3	8.3	C72	6.5

*033A7Y additionally contains 1.5% THF-OH (C114) and 1% Isopar L (C77)

The compositions of Example 149 Table a and comparative compositions of glyphosate IPA were applied to morningglory (IPOSS) plants. Results, averaged for all replicates of each treatment, are shown in Example 149 Table b.

Example 149 Table b IPOSS %inhibition 14 days after treatment

Composition	200 g a.e./ha	400 g a.e./ha	600 g a.e./ha	800 g a.e./ha
033A7Y	54.2	80.8	84.2	84.2
033B3S	35	65	75	80
033C9P	43.3	63.3	77.5	79.2
033D5V	35	71.7	77.5	79.2
033E5G	59.2	80	81.7	81.7
033F8L	2.5	71.7	72.5	80
033G7N	10	58.3	70	78.3
Roundup UltraMax	41.7	70.8	76.7	80

The efficacy of formulations 033A7Y, 033C9P, 033D5V and 033E5G, containing short chain amine stabilizers, was similar to or exceeded the efficacy of the Roundup UltraMax standard.

Example 150

The efficacy effect of stabilizers on glyphosate IPA salts with cationic and nonioic surfactants was evaluated. The glyphosate salt and concentration in g a.e./liter for each composition, and the remaining components are as indicated in Example 150 Table a.

Example 150 Table a

Comp.	Salt	[Gly]	Comp. 1	% w/v	Comp. 2	%w/v	Comp. 3	%w/v
043A3C	IPA	360	C27	6.4	C43	9.6	C10*	1
043B9M	K	480	C5	4.9	C110	7.4	C91	6.5
043C3D	K	480	C5	4.9	C109	7.4	C91	6.5
043D1L	K	480	C46	3.7	C107	5.6	C15**	2
043E5G	K	480	C46	3.7	C108	5.6	C15**	2
043F8K	K	480	C46	3.7	C109	5.6	C15**	2
043G1Q	K	480	C46	3.7	C110	5.6	C15**	2

*043A3C additionally contains 1.5% THF-OH (C114)

**043D1L, 043E5G, 043F8K and 043G1Q each additionally contain 1.5% Octylamine (C91)

The compositions of Example 150 Table a and comparative compositions of glyphosate IPA were applied to Velvetleaf (ABUTH) and Japanese millet (ECHCF) plants. Results, averaged for all replicates of each treatment, are shown in Example 150 Tables b and c.

Example 150 Table b ABUTH %inhibition 17 days after treatment

Composition	100 g a.e./ha	200 g a.e./ha	300 g a.e./ha	400 g a.e./ha
043A3C	75	89.2	95.5	98.5
043B9M	49.2	81.7	90	95.8
043C3D	59.2	80.8	89.2	94
043D1L	27.5	76.7	80	88.3
043E5G	66.7	76.7	88.3	93.3
043F8K	68.3	81.7	87.5	90.8
043G1Q	76.7	78.3	88.3	93
Roundup UltraMax	26.7	81.7	87.5	92.5
Comp. 725K	14.2	41.7	65	79.2

Example 150 Table c ECHCF %inhibition 17 days after treatment

Composition	100 g a.e./ha	200 g a.e./ha	300 g a.e./ha	400 g a.e./ha
043A3C	65	78.3	80	85
043B9M	57.5	73.3	80.8	86.7
043C3D	57.5	72.5	80	88.5
043D1L	55.8	70.8	75.8	77.5
043E5G	52.5	69.2	75.8	85
043F8K	53.3	70.8	72.5	80
043G1Q	59.2	72.5	73.3	87.3
Roundup UltraMax	55	70.8	79.2	88.8
Comp. 725K	33.3	48.3	56.7	60

The efficacy of formulations 043E5G, 043F8K and 043G1Q containing short chain amine stabilizers, exceeded the efficacy of the Roundup UltraMax standard on velvetleaf.

Example 151

The efficacy effect of stabilizers on glyphosate IPA salts with cationic and nonioic surfactants was evaluated. The glyphosate salt and concentration in g a.e./liter for each composition, and the remaining components are as indicated in Example 151 Table a.

Example 151 Table a

Comp.	Salt	[Gly]	Comp. 1	% w/v	Comp. 2	%w/v	Comp. 3	%w/v
044A3X	IPA	360	C27	6.4	C43	9.6	C10*	1
044B8J	K	480	C5	4.9	C110	7.4	C91	6.5
044C5G	K	480	C5	4.9	C109	7.4	C91	6.5
044D7U	K	480	C86	3.7	C107	5.6	C15**	2
044E2K	K	480	C86	3.7	C108	5.6	C15**	2
044F1Z	K	480	C86	3.7	C109	5.6	C15**	2
044G0P	K	480	C86	3.7	C110	5.6	C15**	2

*043A3X additionally contains 1.5% THF-OH (C114)

**043D7U, 043E2K, 043F1Z and 043G0P each additionally contain 1.5% Octylamine (C91)

The compositions of Example 151 Table a and comparative compositions of glyphosate IPA were applied to Velvetleaf (ABUTH) and Japanese millet (ECHCF) plants. Results, averaged for all replicates of each treatment, are shown in Example 151 Tables b and c.

Example 151 Table b ABUTH %inhibition 17 days after treatment

Composition	100 g a.e./ha	200 g a.e./ha	300 g a.e./ha	400 g a.e./ha
044A3X	71.7	85.8	90.8	95.5
044B8J	61.7	84.2	92.5	93.3
044C5G	65	82.5	89.2	91.7
044D7U	35	74.2	86.7	90
044E2K	46.7	78.3	86.7	90
044F1Z	60	75.8	87.5	90
044G0P	45.8	77.5	85.8	90
Roundup UltraMax	3.3	79.2	88.3	90
Comp. 725K	0	40	77.5	79.2

Example 151 Table c ECHCF %inhibition 17 days after treatment

Composition	100 g a.e./ha	200 g a.e./ha	300 g a.e./ha	400 g a.e./ha
044A3X	60	72	83	91
044B8J	53	63	71	76
044C5G	54	73	77	86
044D7U	48	65	71	78
044E2K	44	65	68	84
044F1Z	48	66	68	74
044G0P	42	63	78	81
Roundup UltraMax	33	67	75	83
Comp. 725K	3	38	56	58

The efficacy of all formulations equaled or exceeded the standards for velvetleaf. 044A3X, 044C5G and 043G0P containing short chain amine stabilizers, exceeded the efficacy of the Roundup UltraMax standard on barnyard grass.

Example 152

Stabilizer compatibility evaluation of a mixed active composition comprising about 35.7 wt% a.e. of the potassium salt of glyphosate and about 3.1 wt% a.i. of 2,4-D (Run 018A3D contained about 41.9 wt% a.e. glyphosate IPA and about 3.3% a.i. 2,4-D), and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	Surf.	wt%	Stab.	wt%	Cloudpoint °C
014A4T	C124	9.2	C91	2.8	84
014B8J	C129	9.2	C91	2.8	85
014C5V	C108	9.2	C91	2.8	>90
014D0K	C123	9.2	C91	2.8	79
015E3C	C109	9.2	C91	2.8	60
015F7H	C130	9.2	C91	2.8	76
024G7L	C131	9.2	C91	2.8	62
024H3E	C124	9.2	C125	4.0	69
024I2X	C129	9.2	C125	4.3	71
018A3D	C131	9.8	-----	-----	83

Example 152: Pitted morningglory (IPOLA)% Control 5 Days after Treatment for potassium glyphosate + 2,4-D formulations, and standard Composition 304I

Run	50 g a.e./ha	100 g a.e./ha	200 g a.e./ha	300 g a.e./ha
014A4T	61	70	88	90
014B8J	64	75	83	86
014C5V	63	77	81	86
014D0K	60	84	87	86
015E3C	68	72	82	84
015F7H	63	73	85	85
024G7L	61	75	82	86
024H3E	64	68	77	83
024I2X	54	74	83	83
018A3D	63	75	87	83
78510	61	75	86	88

All formulations tested gave results that were statistically the same.

Example 152: Cockleburr (XANST)% Control 7 Days after Treatment for potassium glyphosate + 2,4-D formulations, and standard Composition 304I

Run	50 g a.e./ha	100 g a.e./ha	200 g a.e./ha	300 g a.e./ha
014A4T	21	37	65	78
014B8J	20	43	66	70
014C5V	21	41	60	78
014D0K	20	40	61	68
015E3C	21	48	62	69
015F7H	18	34	55	74
024G7L	18	38	63	64
024H3E	15	46	55	62
024I2X	15	38	66	90
018A3D	20	34	61	77
78510	21	40	50	68

Performance varied with application rate. At 100 g/ha formulations 015E3C and 024H3E were surperior; at 200 g/ha formulations 014A4T and 014B8J gave the highest efficacy; and at 300 g/ha formulation 024I2X gave the highest performance.

Example 153

Stabilizer compatibility evaluation of a mixed active composition comprising about the potassium salt of glyphosate (reported in wt% a.e.) and 2,4-D (reported in wt% a.i.), and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	wt% gly	wt% 2,4-D	Surf.	wt%	Stab.	wt%	Cloudpoint °C
034A3C	35.7	2.9	C124	9.3	C128	2.7	58
034B5F	34.9	2.9	C129	9.2	C128	2.7	60
034C7U	32.0	2.8	C130	9.7	C128	2.6	59
028A5V	34.5	3.0	C123	8.7	C47	5.8	61
028B7J	34.7	3.3	C129	10.1	C47	6.1	58

Example 153: XANST% Control 7 Days after Treatment for potassium glyphosate + 2,4-D formulations, and standard Composition 304I.

Run	50 g a.e./ha	100 g a.e./ha	200 g a.e./ha	300 g a.e./ha
034A3C	24	34	50	50
034B5F	29	34	49	45
034C7U	27	40	47	55
028A5V	30	35	45	45
028B7J	30	35	50	52
78510	32	39	41	45

All formulations gave statistically equal efficacy at all application rates.

Example 154

Stabilizer compatibility evaluation of composition trials 762 and 542 comprising 30.5% a.e. glyphosate IPA and the listed components. Stability was evaluated after 3 days at 50°C and at RT. Table 154a give the formulation and Table 154b give the stability results.

Table 154a

Run	Comp 1	wt%	Comp 2	wt%	Comp 3	wt%	Comp 4	wt%
762A3S	C143	5	C43	4	C146	4	C147	2
762B9I	C144	5	C145	5	C146	4	C147	2
542A7B	C28	5.4	C43	4.6	C146	2	C147	3

Table 154b

Run	50°C	RT
762A3S	Stable	Stable
762B9I	Stable	Stable
542A7B	Stable	Stable

The present invention is not limited to the above embodiments and can be variously modified. The above description of the preferred embodiment is intended

only to acquaint others skilled in the art with the invention, its principles, and its practical application so that others skilled in the art may adapt and apply the invention in its numerous forms, as may be best suited to the requirements of a particular use.

Example 155

Stabilizer compatibility evaluation of a mixed active composition comprising the potassium (K) or IPA (I) salt of glyphosate (reported in wt% a.e.) and 2,4-D (reported in wt% a.e.) in either the acid (A) or IPA salt (I) form, and the listed surfactant (Surf.) and stabilizer (Stab.) components.

Run	wt% gly	wt% 2,4-D	Surf.	wt%	Stab.	wt%
559-4V	28.7 (K)	1.6 (A)	C124	9.2	---	---
559-8R	28.7 (K)	1.3 (I)	C124	9.2	---	---
559-3S	28.7 (K)	1.6 (A)	C129	9.2	---	---
559-7Y	28.7 (K)	1.3 (I)	C129	9.2	---	---
513E7H	31 (I)	2.6 (I)	C124	7.5	C127	1.5
891A3D	31 (I)	2.6 (I)	C124	7.5	C127	2.2
563-1Q	28.7 (K)	1.6 (A)	C124	9.2	C93	0.5
564A8N	28.7 (K)	1.6 (A)	C124	9.2	C93	1.0
564B2K	28.7 (K)	1.3 (I)	C124	9.1	C93	1.0
569-2Z	28.7 (K)	1.9 (I)	C124	7.2	C91	1.5

The compositions of Example 155 Table a and comparative compositions of Roundup® Ultramax and RT Master® were applied to Morningglory (IPOLA) and Cocklebur (XANST) plants. Results, averaged for all replicates of each treatment, are shown in Example 155 Tables b and c.

Example 155 Table b: IPOLA %inhibition thirteen days after treatment

Run	100 g	200 g	300 g	400 g
559-4V	52	77	80	84
559-8R	53	63	84	84
559-3S	46	70	82	80
559-7Y	52	72	81	86
513E7H	51	73	82	83
891A3D	87	84	86	82
563-1Q	54	72	82	83
564A8N	58	67	83	83
564B2K	58	75	82	84
569-2Z	66	80	82	88
Ultramax	22	46	54	58
Master	60	72	82	87

Example 155 Table c: XANST %inhibition thirteen days after treatment

Run	100 g	200 g	300 g	400 g
559-4V	31	52	74	78
559-8R	22	50	64	74
559-3S	30	70	76	81
559-7Y	44	62	74	70
513E7H	30	57	68	77
891A3D	32	55	71	80
563-1Q	37	54	87	78
564A8N	36	63	70	76
564B2K	37	62	81	81
569-2Z	26	70	70	78
Ultramax	34	57	79	88
Master	43	58	71	81

The efficacy of 2-4D acid and salt is similar. Dipropylene glycol did not affect efficacy. Oxalic acid and octylamine has marginal effect on efficacy.

Example 156

Stabilizer compatibility evaluation of a mixed active composition comprising the potassium salt of glyphosate, 2,4-D, and the listed surfactant (Surf.) and stabilizer (Stab.) components. See Table 156a for composition formulations.

Example 156 table a.

Run	wt% a.e. gly	wt% a.e. 2,4-D	Surf.	wt%	Stab.	Wt%
506A3M	40.5	0.72	C129	7.25	---	---
506B6D	40.6	0.71	C129	7.25	---	---
510A5T	41.6	0.60	C124	7.60	---	---
510B3O	40.5	0.60	C124	7.60	---	---
508A1L	40.5	0.72	C129	7.60	---	---
508B7U	40.5	0.72	C129	7.60	---	---
503B7H	40.4	0.66	C124	9.10	---	---
504A5J	40.4	0.65	C124	9.10	---	---
504B9K	40.5	0.74	C129	9.10	---	---
505A2C	40.5	0.72	C129	9.10	---	---
100B8G	32.4	1.60	C124	9.20	---	---
085A3F	31.9	1.60	C124	9.10	---	---
501A2W	32.4	1.66	C129	9.20	---	---
501B6H	32.4	1.82	C129	9.10	---	---
047B1L	32.5	3.13	C124	9.20	C91	2.16
059A0I	32.5	3.13	C129	9.20	C91	2.20

The compositions of Example 156 Table a and comparative compositions of Roundup® Ultramax and/or a standard (510S4V) containing 260 g a.e./l IPA glyphosate, 2.6 g a.e./l IPA 2-4D and 9.8 wt% ethoxylated (6 EO) tallow amine surfactant were applied to Morningglory (IPOLA) and Cocklebur (XANST) plants.

Results, averaged for all replicates of each treatment, are shown in Example 156 Tables b, c and d.

Example 156 table b: IPOLA %inhibition

Run	100 g	200 g	400 g
506A3M	30	68	75
506B6D	33	48	80
510A5T	62	59	85
510B3O	42	65	79
508A1L	35	77	80
508B7U	3	70	74
503B7H	30	52	74
504A5J	32	71	80
504B9K	26	43	73
505A2C	28	62	80
Ultramax	36	36	41
510S4V	72	85	85

Each composition outperformed the Ultramax standard. The IPA standard provided the greatest efficacy.

Example 156 table c: IPOLA %inhibition

Run	100 g	200 g	300 g	400 g
100B8G	60	77	81	93
085A3F	60	78	79	83
501A2W	65	79	82	84
501B6H	63	83	80	91
047B1L	87	86	90	93
059A0I	72	89	88	97
510S4V	75	83	92	88

Formulations 047B1L and 059A0I gave greater overall control on IPOLA than did the 510S4V standard.

Example 156 table d: XANST %inhibition

Run	100 g	200 g	300 g	400 g
100B8G	39	69	73	70
085A3F	42	65	83	83
501A2W	56	71	82	91
501B6H	59	65	77	84
047B1L	59	73	88	97
059A0I	71	80	88	90
510S4V	53	70	78	83

Formulations 047B1L, 059A0I, 501A2W and 501B6H gave greater overall control on XANST than did the 510S4V standard.

The present invention is not limited to the above embodiments and can be variously modified. The above description of the preferred embodiment is intended

only to acquaint others skilled in the art with the invention, its principles, and its practical application so that others skilled in the art may adapt and apply the invention in its numerous forms, as may be best suited to the requirements of a particular use.

With reference to the use of the word(s) "comprise" or "comprises" or "comprising" in this entire specification (including the claims below), Applicants note that unless the context requires otherwise, those words are used on the basis and clear understanding that they are to be interpreted inclusively, rather than exclusively, and that Applicants intend each of those words to be so interpreted in construing this entire specification.

WHAT IS CLAIMED IS:

1. An aqueous pesticidal concentrate microemulsion composition comprising:

a water-soluble pesticide dissolved in an aqueous medium, the water-soluble pesticide being present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

a substantially water-immiscible organic solvent; and

a surfactant component comprising one or more surfactants present in a concentration sufficient to provide acceptable temperature stability of the microemulsion such that the microemulsion has a cloud point of at least about 50°C and a crystallization point not greater than about -10°C, wherein the concentrate composition is optically transparent.

2. The composition of claim 1 wherein said surfactant component comprises one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound, said compounds being present in an amount which enhances the compatibility of said surfactant component with the herbicide and which provides an optically transparent composition.

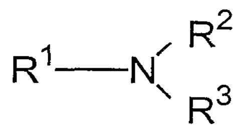
3. The composition of claim 1 wherein the crystallization point is not greater than about -20°C.

4. The composition of claim 1 wherein the cloud point is at least about 60°C.

5. The composition of claim 1 wherein said surfactant component comprises one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms

and not more than ten ethylene oxide linkages within the compound, said compounds being present in an amount which enhances the compatibility of said surfactant component with the herbicide.

6. The composition of claim 5 wherein said compounds are selected from the group consisting of amines or quaternary ammonium salts having the formula:



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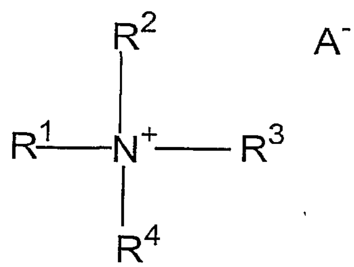

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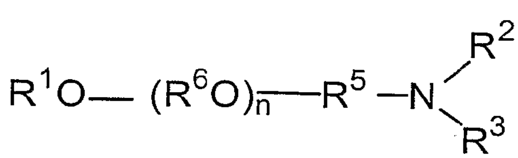

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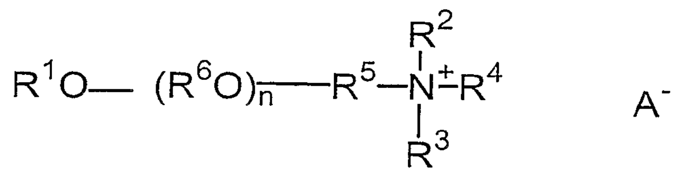


(8)

wherein R^1 is linear or branched alkyl or aryl having from about 4 to about 16 carbon atoms, R^2 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_xH$, R^3 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_yH$ wherein the sum of X and y is not more than about 5; R^4 is hydrogen or methyl; R^6 in each of the n (R^6O) groups is independently C_2-C_4 alkylene; R^5 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; and A- is an agriculturally acceptable anion.

7. The composition of claim 1 wherein the pesticide is glyphosate or a salt or ester thereof.

8. The composition of claim 7 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

9. The composition of claim 8 wherein the glyphosate is predominantly in the form of the potassium salt thereof.

10. The composition of claim 1 wherein the composition is stable after storage at 50 C for at least 14 days.

11. The composition of claim 10 wherein the composition is stable after storage at 50 C for about 28 days.

12. The composition of claim 1 wherein the composition has a viscosity of less than about 1000 centipoise at 0°C at 45/s shear rate.

13. The composition of claim 12 wherein the composition has a viscosity of less than about 700 centipoise at 0°C at 45/s shear rate.

14. The composition of claim 13 wherein the composition has a viscosity of less than about 400 centipoise at 0°C at 45/s shear rate.

15. The composition of claim 14 wherein the composition has a viscosity of less than about 225 centipoise at 0°C at 45/s shear rate.

16. The composition of claim 1 wherein said surfactant component is selected such that the composition exhibits no crystallization of said pesticide when stored at a temperature of about -20 C for a period of about 7 days.

17. The composition of claim 1 wherein said surfactant component is selected such that the composition exhibits no crystallization of said pesticide when stored at a temperature of about -10 C for a period of about 7 days.

18. The composition of claim 9 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said aqueous phase in an amount of about 310 to about 600 grams of acid equivalent per liter of the composition.

19. The composition of claim 18 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said aqueous phase in an amount of about 360 to about 600 grams of acid equivalent per liter of the composition.

20. The composition of claim 19 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said aqueous phase in an amount of about 400 to about 600 grams of acid equivalent per liter of the composition.

21. The composition of claim 20 wherein the concentration of said glyphosate is from about 450 to about 600 grams of acid equivalent per liter of the composition.

22. The composition of claim 21 wherein the concentration of said glyphosate is from about 480 to about 600 grams of acid equivalent per liter of the composition.

23. The composition of claim 22 wherein the concentration of said glyphosate is from about 500 to about 600 grams of acid equivalent per liter of the composition.

24. The composition of claim 22 wherein the concentration of said glyphosate is from about 480 to about 580 grams of acid equivalent per liter of the composition.

25. The composition of claim 24 wherein the concentration of said glyphosate is from about 540 to about 600 grams of acid equivalent per liter of the composition.

26. The composition of claim 1 wherein the total amount of surfactant is from about 20 to about 300 grams per liter of the composition.

27. The composition of claim 1 further including an additional water-soluble herbicide selected from the group consisting of acifluorfen, acrolein, amitrole, asulam, benazolin, bentazon, bialaphos, bromacil, bromoxynil, chloramben, chloroacetic acid, clopyralid, 2,4-D, 2,4-DB, dalapon, dicamba, dichlorprop, difenzoquat, diquat, endothall, fenac, fenoxaprop, flamprop, flumiclorac, fluoroglycofen, flupropanate, fomesafen, fosamine, glufosinate, imazameth, imazamethabenz, imazamox, imazapic, imazapyr, imazaquin, imazethapyr, ioxynil,

MCPA, MCPB, mecoprop, methylarsonic acid, naptalam, nonanoic acid, paraquat, picloram, quinclorac, sulfamic acid, 2,3,6-TBA, TCA, triclopyr and water-soluble salts thereof.

28. The composition of claim 1 wherein the composition is substantially homogeneous upon storage at 50°C for one week.

29. The composition of claim 1 wherein said surfactant component comprises at least one cationic surfactant.

30. The composition of claim 29 wherein said surfactant component further comprises at least one nonionic surfactant.

31. A liquid herbicidal concentrate emulsion composition having a continuous aqueous phase and a discontinuous oil phase, the composition comprising:

glyphosate predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof, in solution in said aqueous phase in a concentration that is biologically effective when the composition is diluted in a suitable volume of water to form an enhanced application mixture and applied to foliage of a susceptible plant;

an oil phase comprising a substantially water-immiscible organic solvent; and

a surfactant component in solution or stable suspension, emulsion, or dispersion in said aqueous phase, comprising one or more surfactants present in a concentration sufficient to provide acceptable temperature stability of the emulsion such that the emulsion has a cloud point of at least about 50°C and a crystallization point not greater than about -10°C.

32. The composition of claim 31 wherein said surfactant component comprises one or more amine or quaternary ammonium salt compounds, each of which

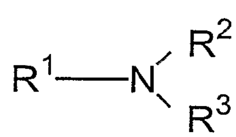
comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound, said compounds being present in an amount which enhances the compatibility of said surfactant component with the herbicide and which provides an optically transparent composition.

33. The composition of claim 31 wherein the crystallization point is not greater than about -20°C.

34. The composition of claim 31 wherein the cloud point is at least about 60°C.

35. The composition of claim 31 wherein said surfactant component comprises one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound, said compounds being present in an amount which enhances the compatibility of said surfactant component with the herbicide.

36. The composition of claim 35 wherein said compounds are selected from the group consisting of amines or quaternary ammonium salts having the formula:



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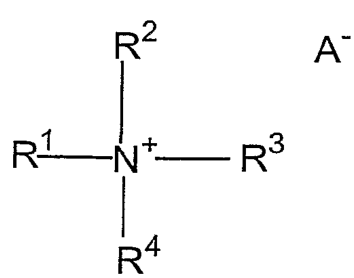

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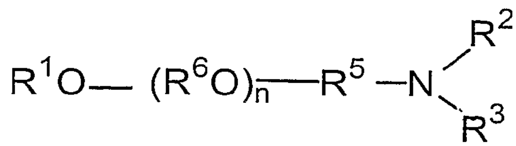

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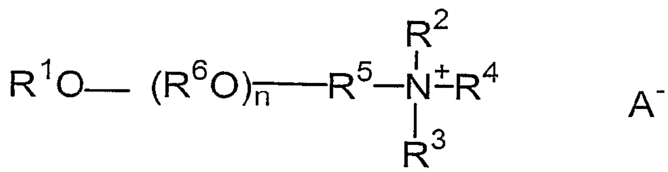


(8)

wherein R^1 is linear or branched alkyl or aryl having from about 4 to about 16 carbon atoms, R^2 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_xH$, R^3 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_yH$ wherein the sum of X and y is not more than about 5; R^4 is hydrogen or methyl; R^6 in each of the n (R^6O) groups is independently C_2-C_4 alkylene; R^5 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; and A- is an agriculturally acceptable anion.

37. The composition of claim 31 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, or hexamethylenediamine salt thereof.

38. The composition of claim 31 wherein said glyphosate is in solution in said aqueous phase in an amount of about 400 to about 600 grams of acid equivalent per liter of the composition.

39. The composition of claim 31 wherein said surfactant component comprises at least one cationic surfactant.

40. The composition of claim 39 wherein said surfactant component comprises at least one nonionic surfactant.

41. An aqueous pesticidal concentrate microemulsion composition comprising:

a water-soluble pesticide dissolved in an aqueous medium, the water-soluble pesticide being present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

a substantially water-immiscible organic solvent; and

a surfactant component comprising at least one cationic surfactant and at least one nonionic surfactant, the surfactant component being present in a concentration sufficient to provide acceptable temperature stability of the emulsion such that the emulsion has a cloud point of at least about 50°C and a crystallization point not greater than about -10°C.

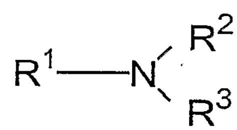
42. The composition of claim 41 wherein said surfactant component comprises one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound, said compounds being present in an amount which enhances the compatibility of said surfactant component with the herbicide and which provides an optically transparent composition.

43. The composition of claim 41 wherein the crystallization point is not greater than about -20°C.

44. The composition of claim 41 wherein the cloud point is at least about 60°C.

45. The composition of claim 41 wherein said surfactant component comprises one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound, said compounds being present in an amount which enhances the compatibility of said surfactant component with the pesticide.

46. The composition of claim 45 wherein said compounds are selected from the group consisting of amines or quaternary ammonium salts having the formula:



(5)

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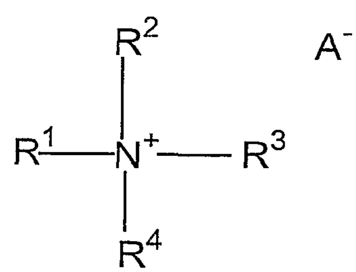

(6)

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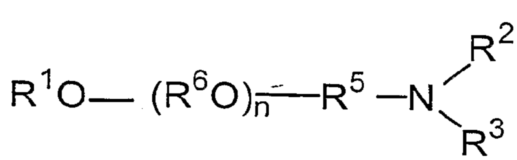
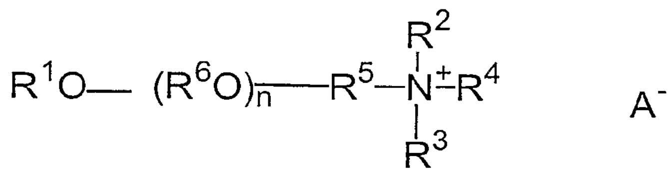


(7)

or



(8)

wherein R^1 is linear or branched alkyl or aryl having from about 4 to about 16 carbon atoms, R^2 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_xH$, R^3 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_yH$ wherein the sum of X and y is not more than about 5; R^4 is hydrogen or methyl; R^6 in each of the n (R^6O) groups is independently C_2-C_4 alkylene; R^5 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; and A- is an agriculturally acceptable anion.

47. The composition of claim 41 wherein the herbicide is glyphosate or a salt or ester thereof.

48. The composition of claim 47 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

49. The composition of claim 48 wherein the glyphosate is predominantly in the form of the potassium salt thereof.

50. The composition of claim 41 wherein the composition is stable after storage at 50 C for at least 14 days.

51. The composition of claim 50 wherein the composition is stable after storage at 50 C for about 28 days.

52. The composition of claim 41 wherein the composition has a viscosity of less than about 1000 centipoise at 0°C at 45/s shear rate.

53. The composition of claim 52 wherein the composition has a viscosity of less than about 700 centipoise at 0°C at 45/s shear rate.

54. The composition of claim 53 wherein the composition has a viscosity of less than about 400 centipoise at 0°C at 45/s shear rate.

55. The composition of claim 54 wherein the composition has a viscosity of less than about 225 centipoise at 0°C at 45/s shear rate.

56. The composition of claim 41 wherein said surfactant component is selected such that the composition exhibits no crystallization of said pesticide when stored at a temperature of about -20 C for a period of about 7 days.

57. The composition of claim 41 wherein said surfactant component is selected such that the composition exhibits no crystallization of said pesticide when stored at a temperature of about -10 C for a period of about 7 days.

58. The composition of claim 47 wherein said glyphosate is in solution in said aqueous phase in an amount of about 310 to about 600 grams of acid equivalent per liter of the composition.

59. The composition of claim 58 wherein the concentration of said glyphosate is from about 360 to about 600 grams of acid equivalent per liter of the composition.

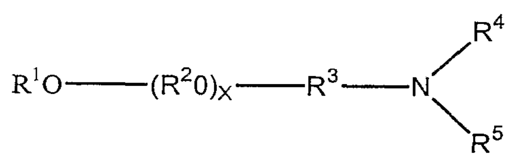
60. The composition of claim 59 wherein the concentration of said glyphosate is from about 400 to about 600 grams of acid equivalent per liter of the composition.

61. The composition of claim 41 wherein the total amount of surfactant is from about 20 to about 300 grams per liter of the composition.

62. The composition of claim 41 wherein the composition is substantially homogeneous upon storage at 50°C for one week.

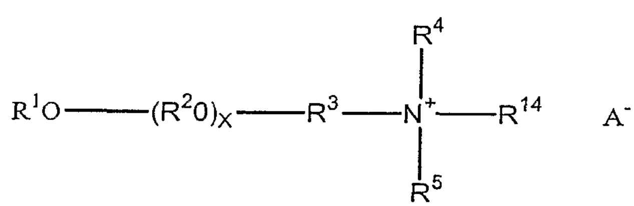
63. The composition of claim 41 wherein said cationic surfactant comprises

(a) aminated alkoxylated alcohol having the formula:



(9)

or

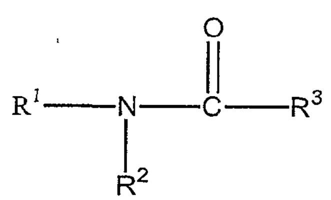


(10)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 and R^6 are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms,

hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-C(=S)NR^{12}R^{13}$ or together with R^5 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^5 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-C(=S)NR^{12}R^{13}$, or together with R^4 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted hydrocarbyl, R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, or $-C(=S)NR^{12}R^{13}$, n is 0 or 1, x and y are independently an average number from 1 to about 60, and A- is an agriculturally acceptable anion;

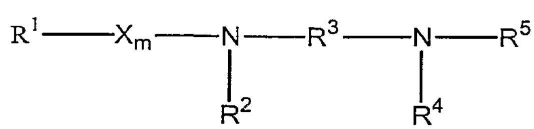
(b) hydroxylated amides having the formula:



(11)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

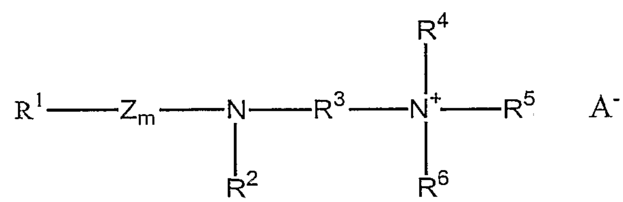
(c) diamines having the formula:



(9)

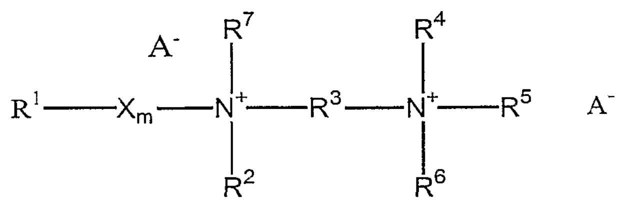
wherein R^1, R^2 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^4 and R^{10} are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, and X is -C(O)- or $-SO_2-$;

(d) mono- or di-ammonium salts having the formula:



(14)

or

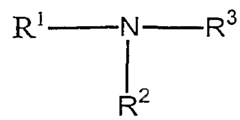


(15)

wherein R^1, R^2, R^4, R^5 and R^7 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^6 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^{10} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is

0 or 1, n is an average number from 0 to about 40, X is -C(O)- or $-SO_2-$, Z is -C(O)-, and A^- is an agriculturally acceptable anion;

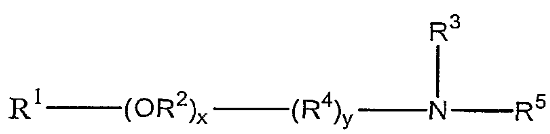
(e) poly(hydroxyalkyl)amines having the formula:



(16)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-R^4OR^5$, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

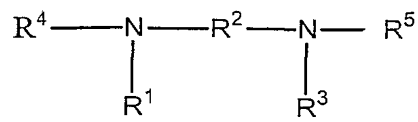
(f) alkoxylated poly(hydroxyalkyl)amines having the formula:



(19)

wherein R^1 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene; R^4 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 30 carbon atoms, R^5 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl; x is an average number from 0 to about 30, and y is 0 or 1;

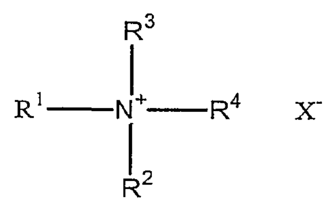
(g) di-poly(hydroxyalkyl)amine having the formula:



(22)

wherein R^1 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 22 carbon atoms, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^4 and R^5 are independently hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

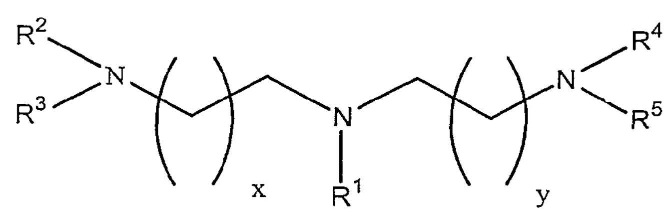
(h) quaternary poly(hydroxyalkyl)amine salts having the formula:



(24)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-X_m-(R^4O)_yR^5$, R^2 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, X- is an agriculturally acceptable anion; R^4 in each of the $y(R^4O)$ groups is independently C_2-C_4 alkylene; R^5 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; X is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms; m is 0 or 1; and y is an average number from 0 to about 30

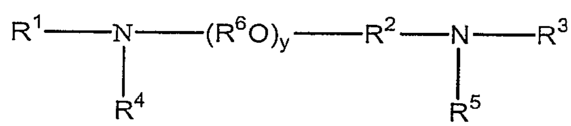
(i) triamines having the formula:



(27)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^8)_s(R^7O)_nR^6$; R^6 is hydrogen or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^7 in each of the n (R^7O) groups is independently C_2-C_4 alkylene; R^8 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, n is an average number from 1 to about 10, s is 0 or 1, and x and y are independently an integer from 1 to about 4;

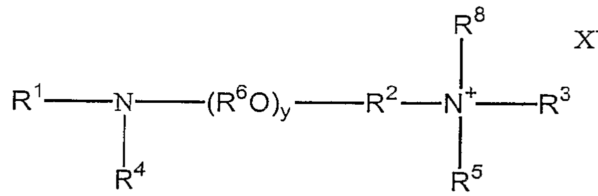
(j) diamines having the formula:



(28)

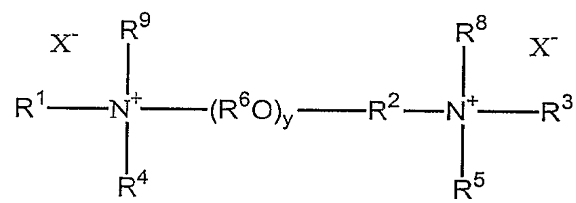
wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $C(=NR^{11})NR^{12}R^{13}$-, $-C(=O)NR^{12}R^{13}$-, $-C(=S)NR^{12}R^{13}$-, $-C(=NR^{12})$-, -C(S)-, or -C(O)-, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x is an average number from 1 to about 50, and y is an average number from 0 to about 60;

(k) mono- or di-quaternary ammonium salts having the formula:



(30)

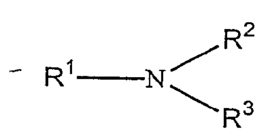
or



(29)

wherein R^1, R^3, R^4, R^5, R^8 and R^9 are independently hydrogen, polyhydroxyalkyl, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 30, y is an average number from about 3 to about 60, and X^- is an agriculturally acceptable anion;

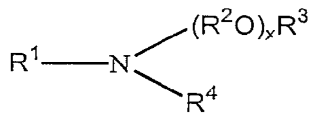
(l) a secondary or tertiary amine having the formula:



(31)

wherein R^1 and R^2 are hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms;

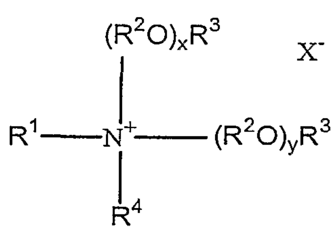
(m) monoalkylated amines having the formula:



(32)

wherein R^1 and R^4 are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or $-R^5SR^6$, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^5 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^6 is a hydrocarbyl or substituted hydrocarbyl group having from 4 to about 15 carbon atoms and x is an average number from 1 to about 60;

(n) dialkoxylated quaternary ammonium salts having the formula:

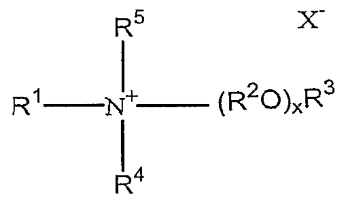


(33)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^4 is hydrogen or hydrocarbyl or substituted hydrocarbyl having

from 1 to about 30 carbon atoms, x and y are independently an average number from 1 to about 40, and X- is an agriculturally acceptable anion;

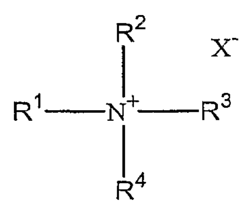
(o) monoalkoxylated quaternary ammonium salts having the formula:



(34)

wherein R^1 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X- is an agriculturally acceptable anion;

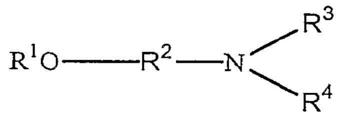
(p) quaternary ammonium salts having the formula:



(35)

wherein R^1, R^3 and R^4 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and X- is an agriculturally acceptable anion;

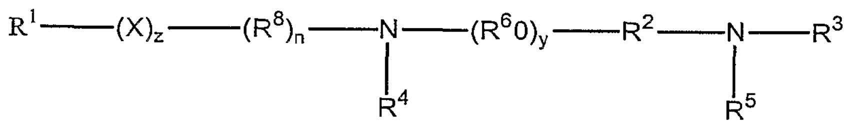
(q) etheramines having the formula:



(36)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^3 and R^4 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^5O)_xR^6$, R^5 in each of the $x(R^5\text{-}O)$ groups is independently C_2-C_4 alkylene, R^6 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 50;

(r) diamines having the formula:

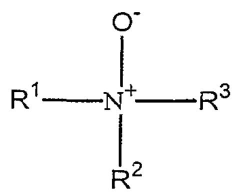


(37)

wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$; R^2 and R^8 are independently hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 30, X is -O-, $-N(R^6)-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^9)C(O)-$, $-C(O)N(R^9)-$, -S-, -SO-, or $-SO_2-$, y is 0 or

an average number from 1 to about 30, n and z are independently 0 or 1, and R^9 is hydrogen or hydrocarbyl or substituted hydrocarbyl;

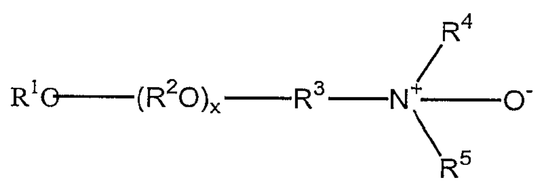
(s) amine oxides having the formula:



(38)

wherein R^1, R^2 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^4O)_xR^5$, or $-R^6(OR^4)_xOR^5$; R^4 in each of the x (R^4 O) groups is independently C_2-C_4 alkylene, R^5 is hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^6 is a hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, x is an average number from 1 to about 50, and the total number of carbon atoms in R^1, R^2 and R^3 is at least 8;

(t) alkoxylated amine oxides having the formula:

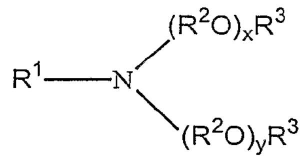


(39)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 is a hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^4 and R^5 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^6)_n-(R^2O)_yR^7$; R^6 is hydrocarbylene or substituted hydrocarbylene containing from 1 to about 6 carbon atoms, R^7 is hydrogen or a linear or branched

alkyl group having 1 to about 4 carbon atoms, n is 0 or 1, and x and y are independently an average number from 1 to about 60;

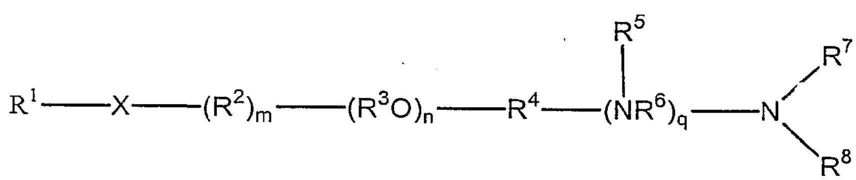
(u) dialkoxylated amines having the formula:



(40)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-R^4SR^5$, or $-(R^2O)_zR^3$, R^2 in each of the x (R^2O), y (R^2O) and z (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^4 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^5 is a linear or branched alkyl group having from about 4 to about 15 carbon atoms, and x, y and z are independently an average number from 1 to about 40, provided, however, that when R^1 is alkyl, either the sum of x and y is greater than 20 or R^3 is other than hydrogen;

(v) aminated alkoxylated alcohols having the following chemical structure:

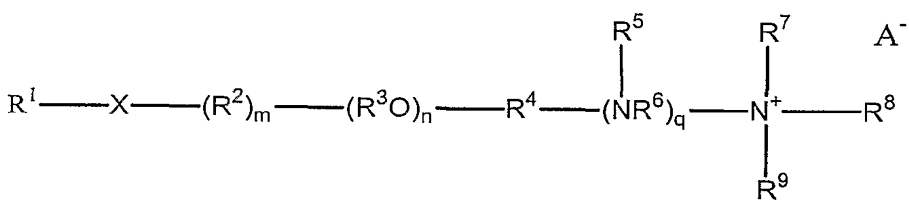


(41)

wherein R^1, R^7, R^8, and R^9 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{11})_s(R^3O)_vR^{10}$; X is -O-, -OC(O)-, -C(O)O-, $-N(R^{12})C(O)-$, $-C(O)N(R^{12})-$, -S-, -SO-, $-SO_2-$ or $-N(R^9)-$; R^3 in each of the n (R^3O) groups and the v (R^3O) groups is independently C_2-C_4 alkylene; R^{10} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average

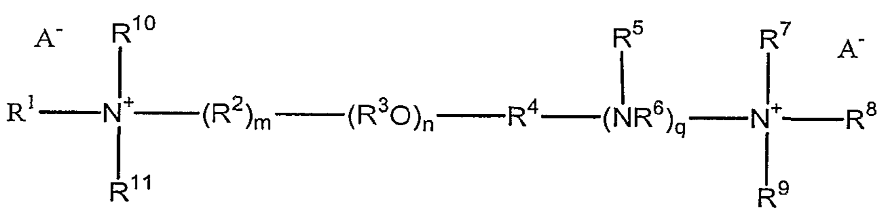
number from 1 to about 50; R^2 and R^{11} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^{12} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; m and s are each independently 0 or 1; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, -C(=NR^{12})-, -C(S)-, or -C(O)-; q is an integer from 0 to 5; and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

(w) a quaternary ammonium, sulfonium or sulfoxonium salt having the following chemical structure:



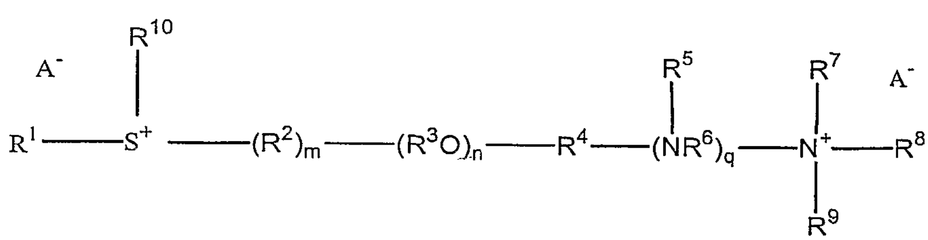
(43)

or



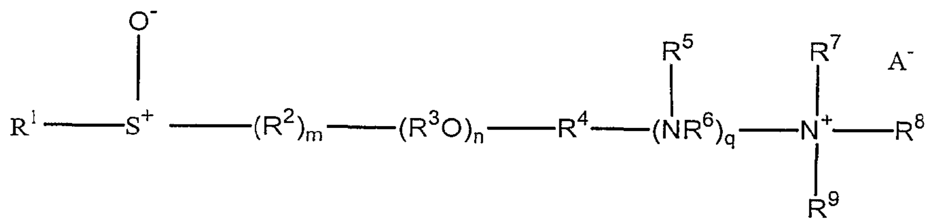
or

(44)



(45)

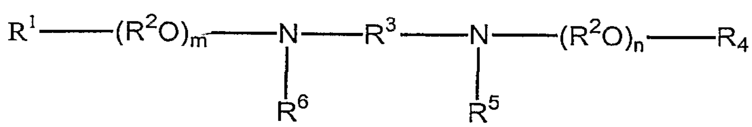
or



(46)

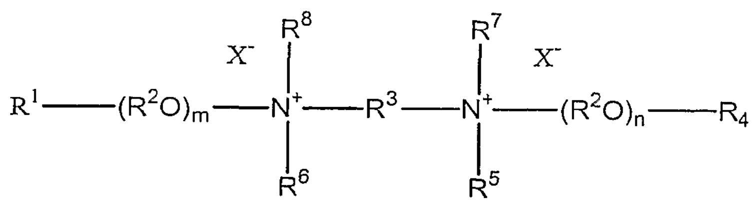
wherein R^1, R^7, R^8, R^9, R^{10} and R^{11} are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{13})_s(R^3O)_vR^{12}$; X is -O-, -OC(O)-, $-N(R^{14})C(O)-$, $-C(O)N(R^{14})-$, -C(O)O-, or -S-; R^3 in each of the n (R^3O) groups and v (R^3O) groups is independently C_2-C_4 alkylene; R^{12} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{13} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; m and s are each independently 0 or 1; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $-C(=NR^{12})-$, -C(S)-, or -C(O)-; R^{14} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, q is an integer from 0 to 5; R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each A^- is an agriculturally acceptable anion;

(x) a diamine or diammonium salt having the formula:



(47)

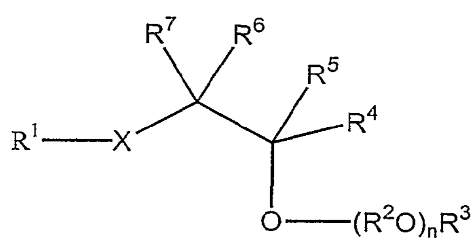
or



(48)

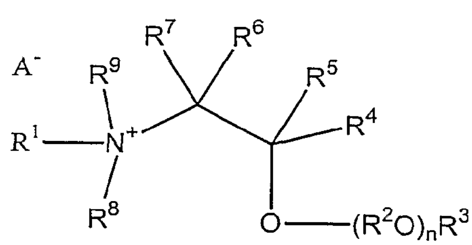
wherein R^1, R^4, R^5, R^6, R^7 and R^8 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the m (R^2O) and n (R^2O) groups and R^9 are independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or $-(R^2O)_pR_9-$, m and n are individually an average number from 0 to about 50, and p is an average number from 0 to about 60; or

(y) a compound of the formula:



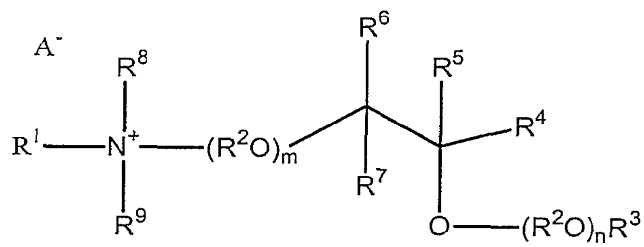
(52)

or



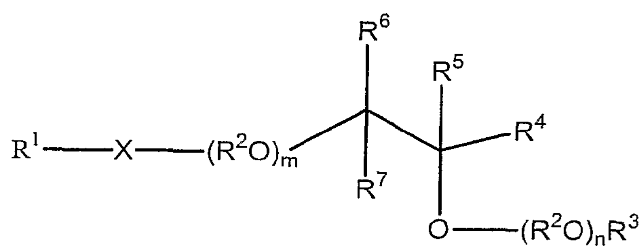
(53)

or



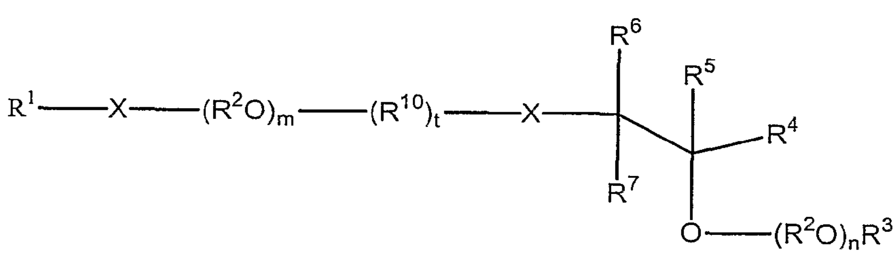
(56)

or



(54)

or



(55)

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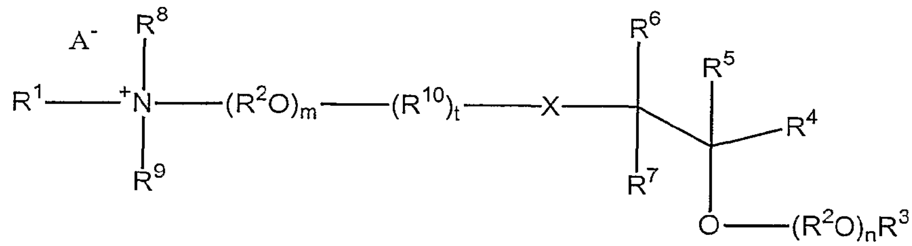
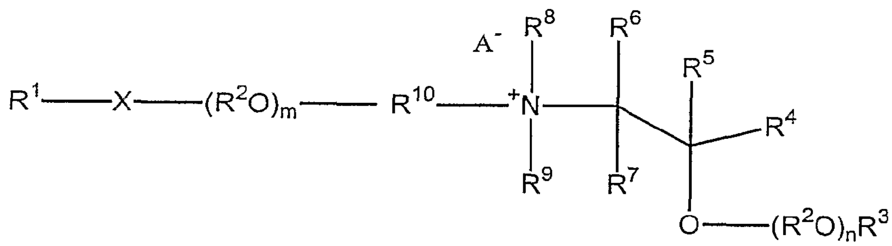


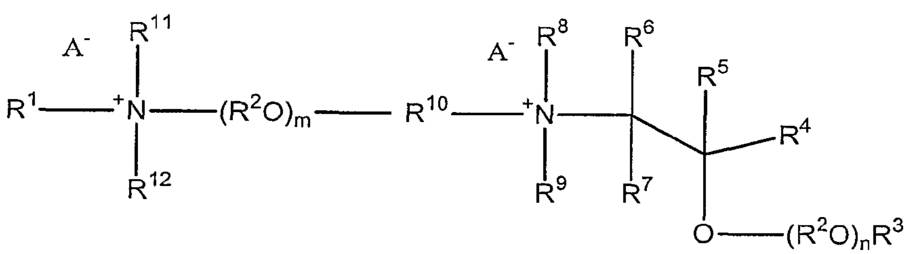
(57)

or



(58)

or



(59)

wherein R^1, R^9, and R^{12} are independently hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^2O)_pR^{13}$; R^2 in each of the m (R^2O), n (R^2O), p (R^2O) and q (R^2O) groups is independently C_2-C_4 alkylene; R^3, R^8, R^{11}, R^{13}

and R^{15} are independently hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^4 is $-(CH_2)_yOR^{13}$ or $-(CH_2)_yO(R^2O)_qR^3$; R^5, R^6 and R^7 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or R^4; R^{10} is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(CH_2)_zO(R^2O)_pR^3$; m, n, p and q are independently an average number from 1 to about 50; X is independently -O-, $-N(R^{14})-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^{15})C(O)-$, $-C(O)N(R^{15})-$, -S-, -SO-, or $-SO_2-$; t is 0 or 1; A- is an agriculturally acceptable anion; and y and z are independently an integer from 0 to about 30.

64. The composition of claim 63 wherein said nonionic surfactant comprises

(a) an alkoxylated alcohol having the formula:

$$R^1O\text{——}(R^2O)_xR^3 \tag{49}$$

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60;

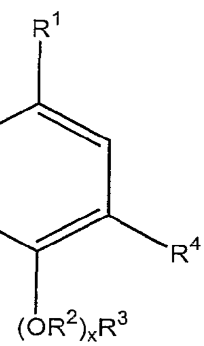
(b) dialkoxylated alcohols having the formula:

$$R^1(OR^2)_xO\text{——}R^3\text{——}O\text{——}(R^2O)_yR^1 \tag{50}$$

wherein R^1 is independently hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^2 in each of the x (R^2O) and the y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene

having from 2 to about 30 carbon atoms, and x and y are independently an average number from 1 to about 60; or

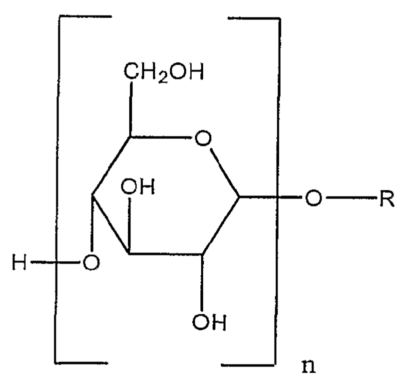
(c) alkoxylated dialkylphenols having the formula:



(51)

wherein R^1 and R^4 are independently hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms and at least one of R^1 and R^4 is an alkyl group, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60; or

(d) a glycoside having the formula:



(61)

wherein n is the degree of polymerization, or number of glycose groups, and R is a branched or straight chain alkyl group preferably having from 4 to 18 carbon atoms, or a mixture of alkyl groups having an average value within the given range.

65. A liquid herbicidal concentrate emulsion composition having a continuous aqueous phase and a discontinuous oil phase, the composition comprising:

(i) a water-soluble herbicide dissolved in said aqueous phase, the water-soluble herbicide being present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

(iii) an oil phase comprising a substantially water-immiscible organic solvent; and

(iv) a surfactant component comprising at least one cationic surfactant, the surfactant component being present in a concentration sufficient to provide acceptable temperature stability of the emulsion such that the emulsion has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

66. The composition of claim 65 wherein the cloud point is at least about 60°C.

67. The composition of claim 65 wherein the herbicide is glyphosate or a salt or ester thereof.

68. The composition of claim 67 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

69. The composition of claim 68 wherein the glyphosate is predominantly in the form of the potassium salt thereof.

70. The composition of claim 65 wherein the composition is stable after storage at 50 C for at least 14 days.

71. The composition of claim 65 wherein the composition is stable after storage at 50 C for about 28 days.

72. The composition of claim 65 wherein the composition has a viscosity of less than about 1000 centipoise at 0°C at 45/s shear rate.

73. The composition of claim 65 wherein said surfactant component is selected such that the composition exhibits no crystallization of said herbicide when stored at a temperature of about 0 C for a period of about 7 days.

74. The composition of claim 65 wherein said glyphosate is in solution in said aqueous phase in an amount of about 310 to about 600 grams of acid equivalent per liter of the composition.

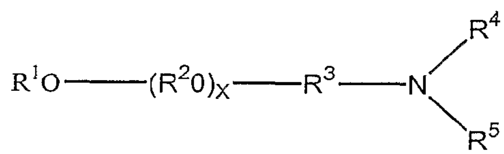
75. The composition of claim 74 wherein said glyphosate is in solution in said aqueous phase in an amount of about 360 to about 600 grams of acid equivalent per liter of the composition.

76. The composition of claim 75 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said aqueous phase in an amount of about 400 to about 600 grams of acid equivalent per liter of the composition.

77. The composition of claim 65 wherein the total amount of surfactant is from about 20 to about 300 grams per liter of the composition.

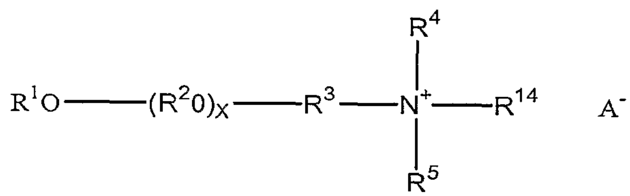
78. The composition of claim 65 wherein the composition is substantially homogeneous upon storage at 50°C for one week.

79. The composition of claim 65 wherein said cationic surfactant comprises
(a) aminated alkoxylated alcohol having the formula:



(9)

or

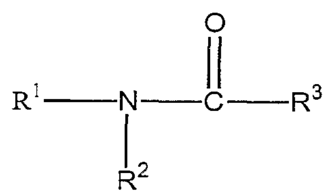


(10)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 and R^6 are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-C(=S)NR^{12}R^{13}$ or together with R^5 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^5 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-C(=S)NR^{12}R^{13}$, or together with R^4 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted

hydrocarbyl, R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, or $-C(=S)NR^{12}R^{13}$, n is 0 or 1, x and y are independently an average number from 1 to about 60, and A- is an agriculturally acceptable anion;

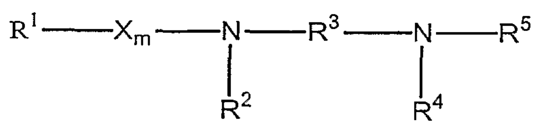
(b) hydroxylated amides having the formula:



(11)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

(c) diamines having the formula:

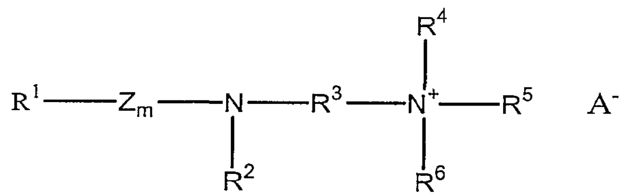


(13)

wherein R^1, R^2 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^4 and R^{10} are independently hydrogen or

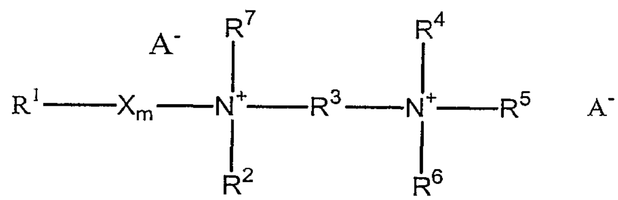
hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, and X is -C(O)- or $-SO_2-$;

(d) mono- or di-ammonium salts having the formula:



(14)

or



(15)

wherein R^1, R^2, R^4, R^5 and R^7 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^6 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^{10} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, X is -C(O)- or $-SO_2-$, Z is -C(O)-, and A^- is an agriculturally acceptable anion;

(e) poly(hydroxyalkyl)amines having the formula:

$$R^1—N(R^2)—R^3$$

(16)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-R^4OR^5$, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

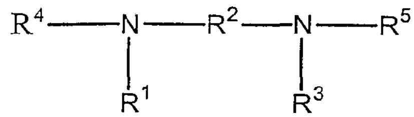
(f) alkoxylated poly(hydroxyalkyl)amines having the formula:

$$R^1—(OR^2)_x—(R^4)_y—N(R^3)—R^5$$

(19)

wherein R^1 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene; R^4 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 30 carbon atoms, R^5 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl; x is an average number from 0 to about 30, and y is 0 or 1;

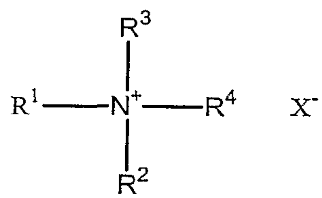
(g) di-poly(hydroxyalkyl)amine having the formula:



(22)

wherein R^1 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 22 carbon atoms, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^4 and R^5 are independently hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

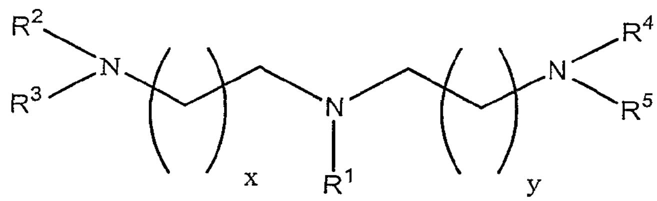
(h) quaternary poly(hydroxyalkyl)amine salts having the formula:



(24)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-X_m-(R^4O)_yR^5$, R^2 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, X- is an agriculturally acceptable anion; R^4 in each of the $y(R^4O)$ groups is independently C_2-C_4 alkylene; R^5 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; X is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms; m is 0 or 1; and y is an average number from 0 to about 30;

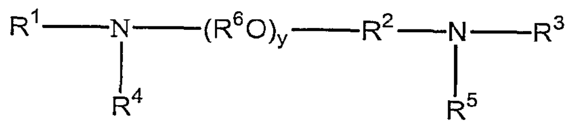
(i) triamines having the formula:



(27)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^8)_s(R^7O)_nR^6$; R^6 is hydrogen or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^7 in each of the n (R^7O) groups is independently C_2-C_4 alkylene; R^8 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, n is an average number from 1 to about 10, s is 0 or 1, and x and y are independently an integer from 1 to about 4;

(j) diamines having the formula:

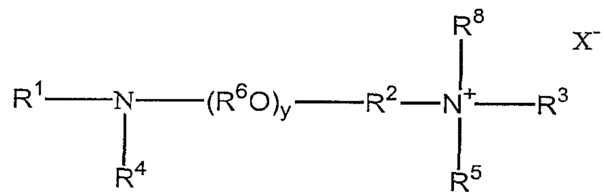


(28)

wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $C(=NR^{11})NR^{12}R^{13}$-, $-C(=O)NR^{12}R^{13}$-, $-C(=S)NR^{12}R^{13}$-, $-C(=NR^{12})$-, -C(S)-, or -C(O)-, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about

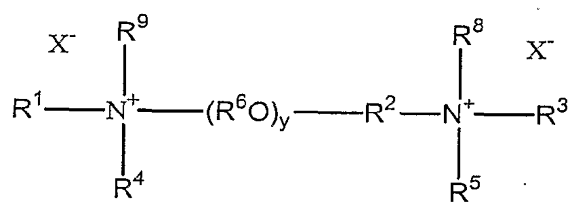
30 carbon atoms, R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x is an average number from 1 to about 50, and y is an average number from 0 to about 60;

(k) mono- or di-quaternary ammonium salts having the formula:



(30)

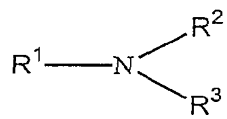
or



(29)

wherein R^1, R^3, R^4, R^5, R^8 and R^9 are independently hydrogen, polyhydroxyalkyl, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 30, y is an average number from about 3 to about 60, and X^- is an agriculturally acceptable anion;

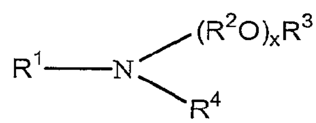
(l) a secondary or tertiary amine having the formula:



(31)

wherein R^1 and R^2 are hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms;

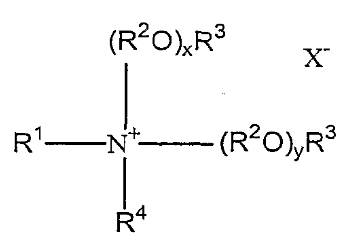
(m) monoalkylated amines having the formula:



(32)

wherein R^1 and R^4 are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or $-R^5SR^6$, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^5 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^6 is a hydrocarbyl or substituted hydrocarbyl group having from 4 to about 15 carbon atoms and x is an average number from 1 to about 60;

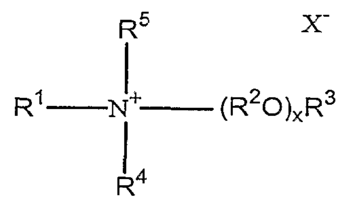
(n) dialkoxylated quaternary ammonium salts having the formula:



(33)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^4 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x and y are independently an average number from 1 to about 40, and X- is an agriculturally acceptable anion;

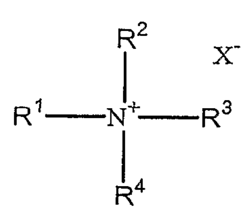
(o) monoalkoxylated quaternary ammonium salts having the formula:



(34)

wherein R^1 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X- is an agriculturally acceptable anion;

(p) quaternary ammonium salts having the formula:

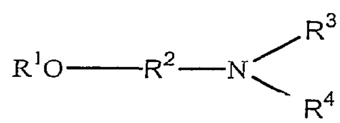


(35)

wherein R^1, R^3 and R^4 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 is hydrocarbyl or substituted

hydrocarbyl having from 1 to about 30 carbon atoms, and X- is an agriculturally acceptable anion;

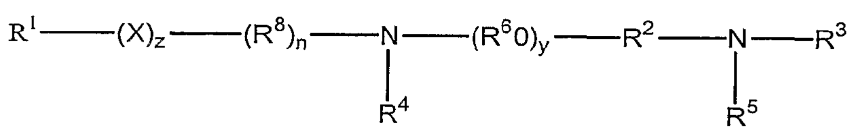
(q) etheramines having the formula:



(36)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^3 and R^4 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^5O)_xR^6$, R^5 in each of the $x(R^5\text{-}O)$ groups is independently C_2-C_4 alkylene, R^6 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 50;

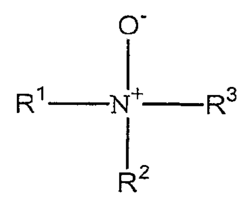
(r) diamines having the formula:



(37)

wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$; R^2 and R^8 are independently hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 30, X is -O-, $-N(R^6)-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^9)C(O)-$, $-C(O)N(R^9)-$, -S-, -SO-, or $-SO_2-$, y is 0 or an average number from 1 to about 30, n and z are independently 0 or 1, and R^9 is hydrogen or hydrocarbyl or substituted hydrocarbyl;

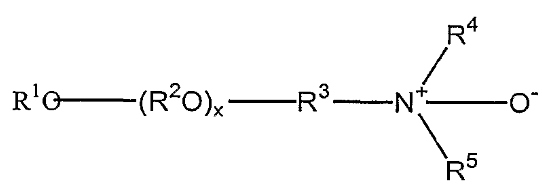
(s) amine oxides having the formula:



(38)

wherein R^1, R^2 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^4O)_xR^5$, or $-R^6(OR^4)_xOR^5$; R^4 in each of the x (R^4 O) groups is independently C_2-C_4 alkylene, R^5 is hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^6 is a hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, x is an average number from 1 to about 50, and the total number of carbon atoms in R^1, R^2 and R^3 is at least 8;

(t) alkoxylated amine oxides having the formula:

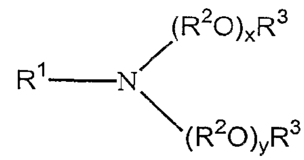


(39)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 is a hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^4 and R^5 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^6)_n-(R^2O)_yR^7$; R^6 is hydrocarbylene or substituted hydrocarbylene containing from 1 to about 6 carbon atoms, R^7 is hydrogen or a linear or branched

alkyl group having 1 to about 4 carbon atoms, n is 0 or 1, and x and y are independently an average number from 1 to about 60;

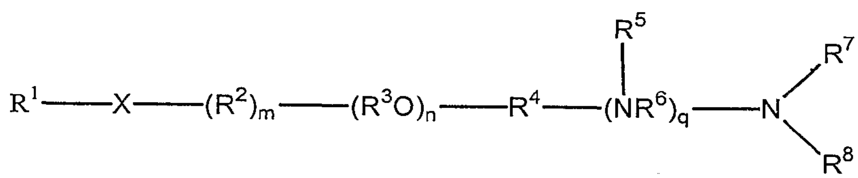
(u) dialkoxylated amines having the formula:



(40)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-R^4SR^5$, or $-(R^2O)_zR^3$, R^2 in each of the x (R^2O), y (R^2O) and z (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^4 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^5 is a linear or branched alkyl group having from about 4 to about 15 carbon atoms, and x, y and z are independently an average number from 1 to about 40, provided, however, that when R^1 is alkyl, either the sum of x and y is greater than 20 or R^3 is other than hydrogen;

(v) aminated alkoxylated alcohols having the following chemical structure:

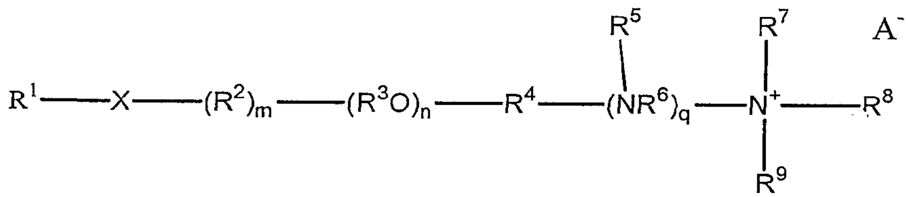


(41)

wherein R^1, R^7, R^8, and R^9 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{11})_s(R^3O)_vR^{10}$; X is -O-, -OC(O)-, -C(O)O-, $-N(R^{12})C(O)-$, $-C(O)N(R^{12})-$, -S-, -SO-, $-SO_2-$ or $-N(R^9)-$; R^3 in each of the n (R^3O) groups and the v (R^3O) groups is independently C_2-C_4

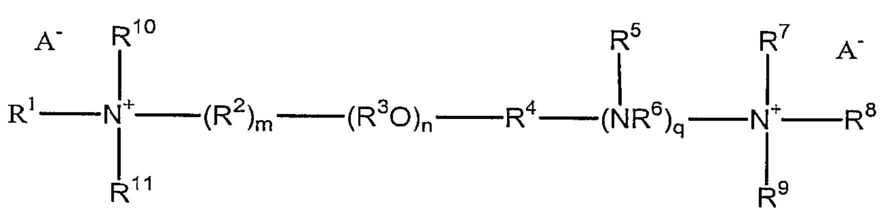
alkylene; R^{10} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{11} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^{12} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; m and s are each independently 0 or 1; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, -C(=NR^{12})-, -C(S)-, or -C(O)-; q is an integer from 0 to 5; and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

(w) a quaternary ammonium, sulfonium or sulfoxonium salt having the following chemical structure:



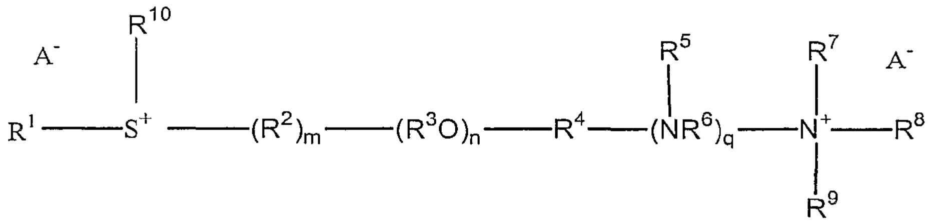
(43)

or



(44)

or



(45)

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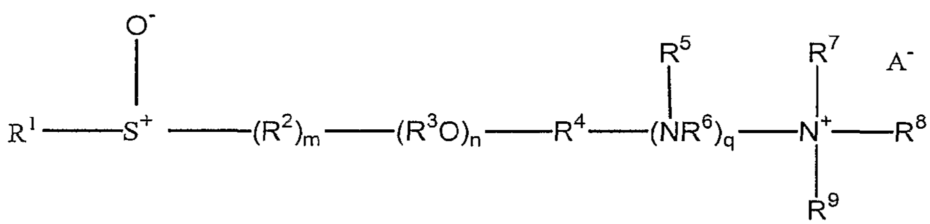
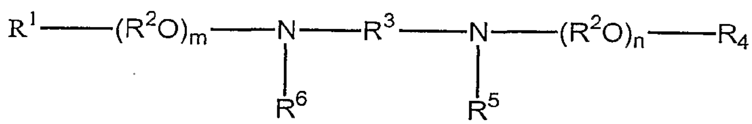


(46)

wherein R^1, R^7, R^8, R^9, R^{10} and R^{11} are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{13})_s(R^3O)_vR^{12}$; X is -O-, -OC(O)-, $-N(R^{14})C(O)-$, $-C(O)N(R^{14})-$, -C(O)O-, or -S-; R^3 in each of the n (R^3O) groups and v (R^3O) groups is independently C_2-C_4 alkylene; R^{12} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{13} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; m and s are each independently 0 or 1; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $-C(=NR^{12})-$, -C(S)-, or -C(O)-; R^{14} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, q is an integer from

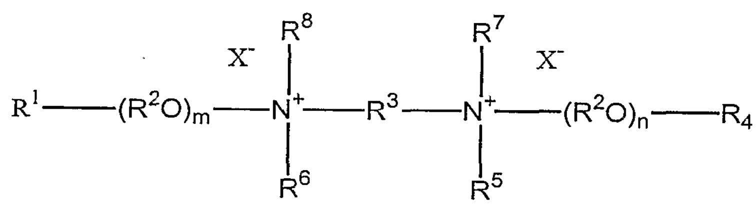
0 to 5; R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each A^- is an agriculturally acceptable anion;

(x) a diamine or diammonium salt having the formula:



(47)

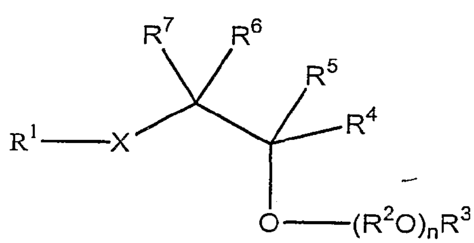
or



(48)

wherein R^1, R^4, R^5, R^6, R^7 and R^8 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the m (R^2O) and n (R^2O) groups and R^9 are independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or $-(R^2O)_pR_9-$, m and n are individually an average number from 0 to about 50, and p is an average number from 0 to about 60; or

(y) a compound of the formula:



(52)

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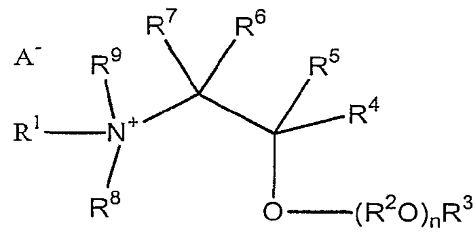

(53)

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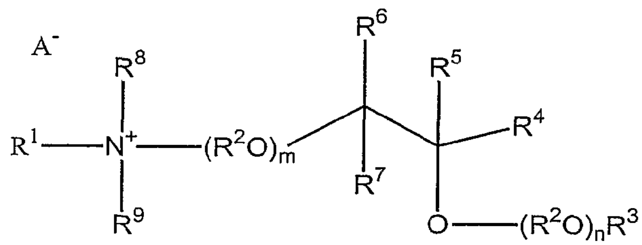

(56)

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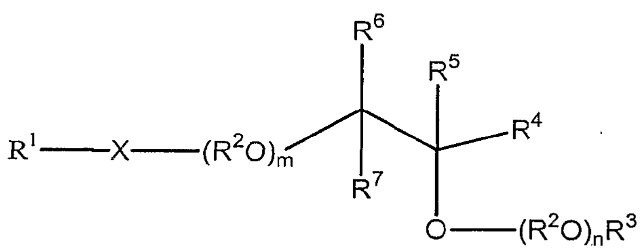

(54)

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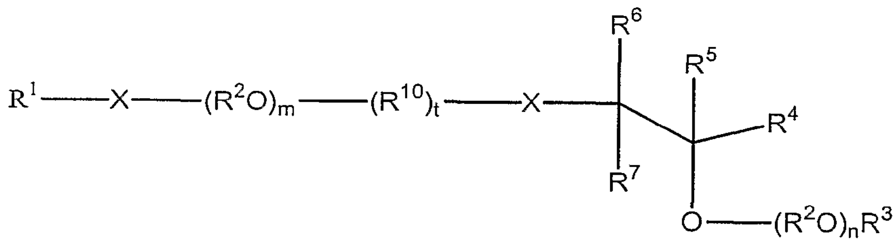

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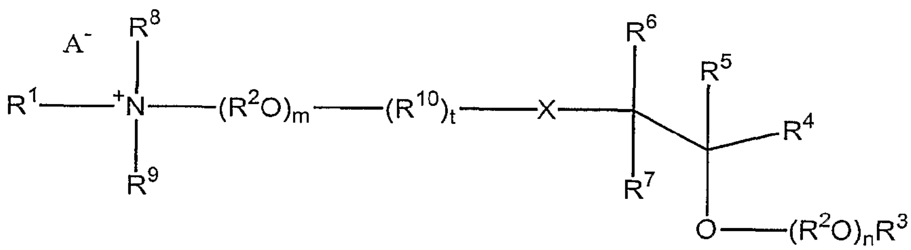

(57)

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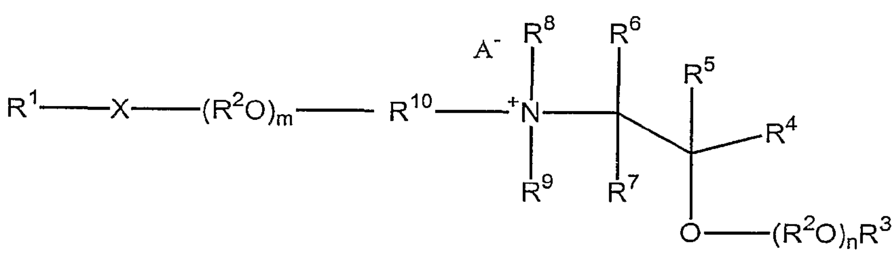

(58)

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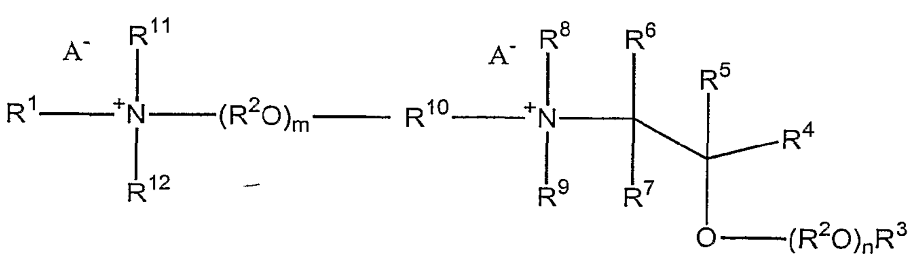


(59)

wherein R^1, R^9, and R^{12} are independently hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^2O)_pR^{13}$; R^2 in each of the m (R^2O), n (R^2O), p (R^2O) and q (R^2O) groups is independently C_2-C_4 alkylene; R^3, R^8, R^{11}, R^{13} and R^{15} are independently hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^4 is $-(CH_2)_yOR^{13}$ or $-(CH_2)_yO(R^2O)_qR^3$; R^5, R^6 and R^7 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or R^4; R^{10} is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(CH_2)_zO(R^2O)_pR^3$; m, n, p and q are independently an average number from 1 to about 50; X is independently -O-, $-N(R^{14})-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^{15})C(O)-$, $-C(O)N(R^{15})-$, -S-, -SO-, or $-SO_2-$; t is 0 or 1; A- is an agriculturally acceptable anion; and y and z are independently an integer from 0 to about 30.

80. The composition of claim 65 wherein said surfactant component further comprises at least one nonionic surfactant comprising

(a) an alkoxylated alcohol having the formula:

$$R^1O—(R^2O)_xR^3 \qquad (49)$$

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60;

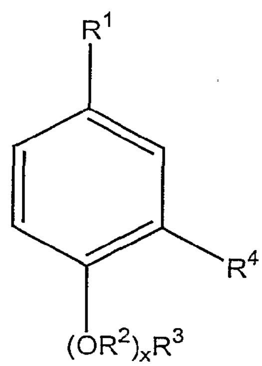
(b) dialkoxylated alcohols having the formula:

$$R^1(OR^2)_xO —— R^3 —— O —— (R^2O)_yR^1$$

(50)

wherein R^1 is independently hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^2 in each of the x (R^2O) and the y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, and x and y are independently an average number from 1 to about 60; or

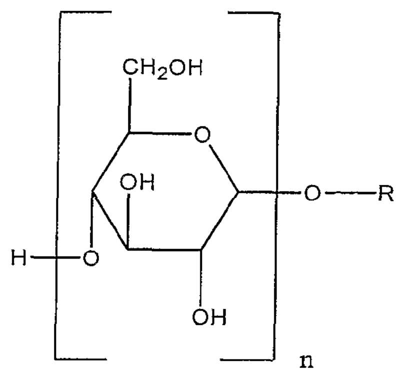
(c) alkoxylated dialkylphenols having the formula:



(51)

wherein R^1 and R^4 are independently hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms and at least one of R^1 and R^4 is an alkyl group, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60; or

(d) a glycoside having the formula:



(61)

wherein n is the degree of polymerization, or number of glycose groups, and R is a branched or straight chain alkyl group preferably having from 4 to 18 carbon atoms, or a mixture of alkyl groups having an average value within the given range.

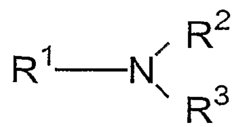
81. An aqueous herbicidal concentrate composition comprising:

(i) a water-soluble herbicide dissolved in an aqueous medium, the water-soluble herbicide being present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

(ii) a surfactant component comprising: at least one cationic surfactant; and one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound, said compounds being present in an amount which enhances the compatibility of said surfactant component with the herbicide; said surfactant component being present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

82. The composition of claim 81 wherein the cloud point is at least about 60°C.

83. The composition of claim 81 wherein said compounds are selected from the group consisting of amines or quaternary ammonium salts having the formula:



(5)

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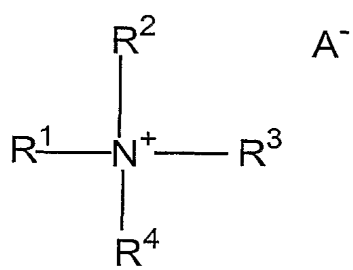
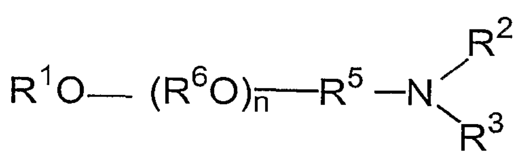


(6)

or



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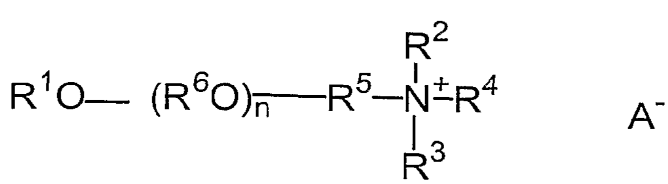


(8)

wherein R^1 is linear or branched alkyl or aryl having from about 4 to about 16 carbon atoms, R^2 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_xH$, R^3 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_yH$ wherein the sum of X and y is not more than about 5; R^4 is hydrogen or methyl; R^6 in each of the n (R^6O) groups is independently C_2-C_4 alkylene; R^5 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; and A- is an agriculturally acceptable anion.

84. The composition of claim 81 wherein the herbicide is glyphosate or a salt or ester thereof.

85. The composition of claim 84 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

86. The composition of claim 85 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, or hexamethylenediamine salt thereof.

87. The composition of claim 81 wherein the surfactant component is in a stable emulsion.

88. The composition of claim 81 wherein the surfactant component is in a stable suspension.

89. The composition of claim 81 wherein the surfactant component is in a stable dispersion.

90. The composition of claim 81 wherein the surfactant component is in a solution.

91. The composition of claim 81 wherein the composition is stable after storage at 50 C for at least 14 days.

92. The composition of claim 81 wherein the composition is stable after storage at 50 C for about 28 days.

93. The composition of claim 81 wherein the composition has a viscosity of less than about 1000 centipoise at 0°C at 45/s shear rate.

94. The composition of claim 81 wherein said surfactant component is selected such that the composition exhibits no crystallization of said herbicide when stored at a temperature of about 0 C for a period of about 7 days.

95. The composition of claim 81 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said medium in an amount of about 310 to about 600 grams of acid equivalent per liter of the composition.

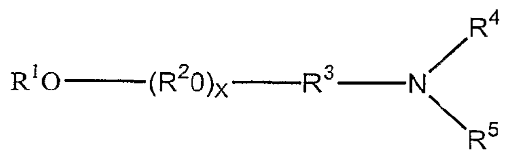
96. The composition of claim 95 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said medium in an amount of about 360 to about 600 grams of acid equivalent per liter of the composition.

97. The composition of claim 84 wherein said glyphosate is in solution in said medium in an amount greater than 450 grams of acid equivalent per liter of the composition.

98. The composition of claim 81 wherein the total amount of surfactant is from about 20 to about 300 grams per liter of the composition.

99. The composition of claim 81 wherein the composition is substantially homogeneous upon storage at 50°C for one week.

100. The composition of claim 81 wherein said cationic surfactant comprises (a) aminated alkoxylated alcohol having the formula:



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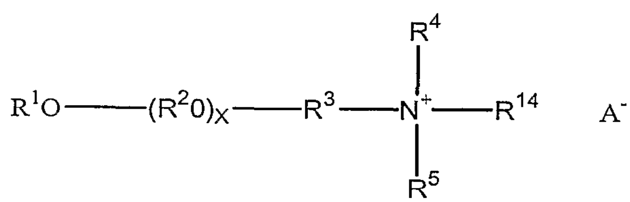
or

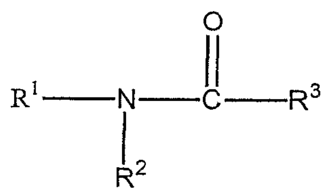


(10)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 and R^6 are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-C(=S)NR^{12}R^{13}$ or together with R^5 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^5 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-C(=S)NR^{12}R^{13}$, or together with R^4 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^7 is hydrogen or a linear or branched alkyl group having 1 to

about 4 carbon atoms; R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted hydrocarbyl, R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, or $-C(=S)NR^{12}R^{13}$, n is 0 or 1, x and y are independently an average number from 1 to about 60, and A- is an agriculturally acceptable anion;

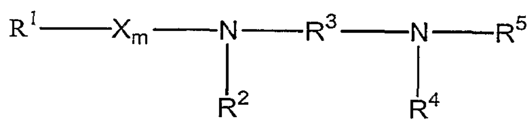
(b) hydroxylated amides having the formula:



(11)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

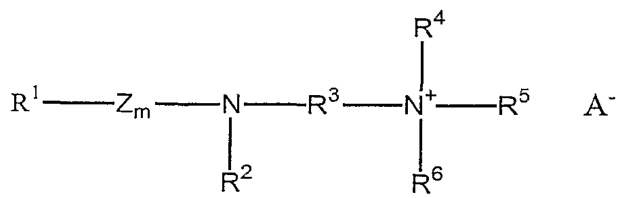
(c) diamines having the formula:



(13)

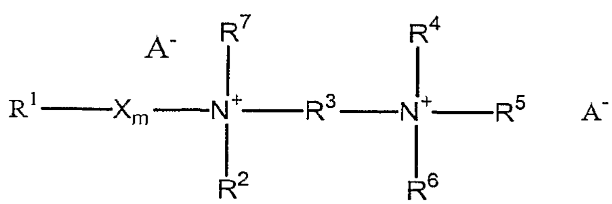
wherein R^1, R^2 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^4 and R^{10} are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, and X is -C(O)- or $-SO_2-$;

(d) mono- or di-ammonium salts having the formula:



(14)

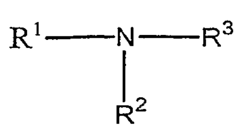
or



(15)

wherein R^1, R^2, R^4, R^5 and R^7 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^6 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^{10} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, X is -C(O)- or $-SO_2$-, Z is -C(O)-, and A^- is an agriculturally acceptable anion;

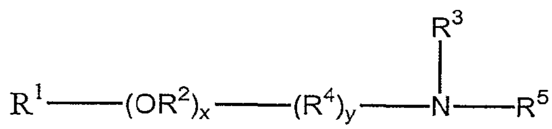
(e) poly(hydroxyalkyl)amines having the formula:



(16)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-R^4OR^5$, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

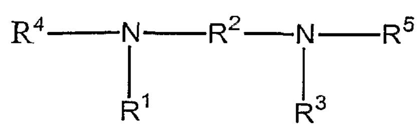
(f) alkoxylated poly(hydroxyalkyl)amines having the formula:



(19)

wherein R^1 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene; R^4 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 30 carbon atoms, R^5 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl; x is an average number from 0 to about 30, and y is 0 or 1;

(g) di-poly(hydroxyalkyl)amine having the formula:

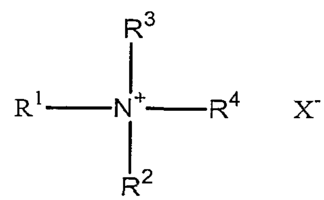


(22)

wherein R^1 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 22 carbon atoms, R^2 is hydrocarbylene or

substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^4 and R^5 are independently hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

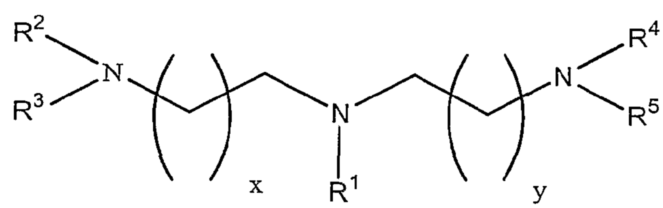
(h) quaternary poly(hydroxyalkyl)amine salts having the formula:



(24)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-X_m-(R^4O)_yR^5$, R^2 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, X- is an agriculturally acceptable anion; R^4 in each of the $y(R^4O)$ groups is independently C_2-C_4 alkylene; R^5 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; X is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms; m is 0 or 1; and y is an average number from 0 to about 30;

(i) triamines having the formula:

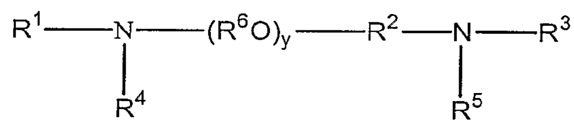


(27)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^8)_s(R^7O)_nR^6$;

R^6 is hydrogen or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^7 in each of the n (R^7O) groups is independently C_2-C_4 alkylene; R^8 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, n is an average number from 1 to about 10, s is 0 or 1, and x and y are independently an integer from 1 to about 4;

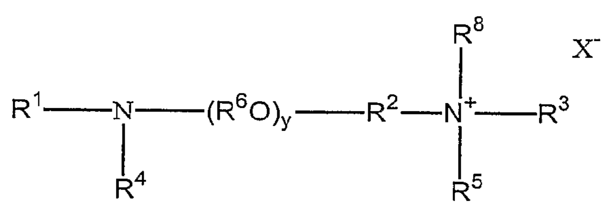
(j) diamines having the formula:



(28)

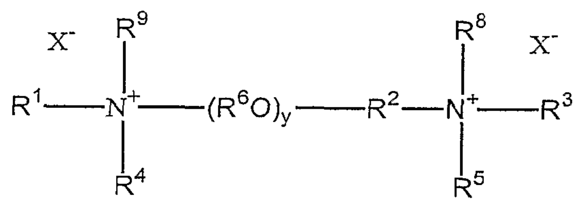
wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $C(=NR^{11})NR^{12}R^{13}$-, $-C(=O)NR^{12}R^{13}$-, $-C(=S)NR^{12}R^{13}$-, $-C(=NR^{12})$-, -C(S)-, or -C(O)-, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x is an average number from 1 to about 50, and y is an average number from 0 to about 60;

(k) mono- or di-quaternary ammonium salts having the formula:



(30)

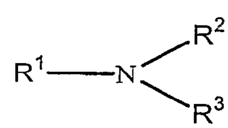
or



(29)

wherein R^1, R^3, R^4, R^5, R^8 and R^9 are independently hydrogen, polyhydroxyalkyl, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 30, y is an average number from about 3 to about 60, and X^- is an agriculturally acceptable anion;

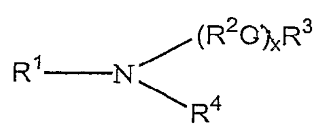
(l) a secondary or tertiary amine having the formula:



(31)

wherein R^1 and R^2 are hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms;

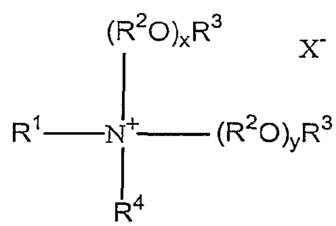
(m) monoalkylated amines having the formula:



(32)

wherein R^1 and R^4 are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or $-R^5SR^6$, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^5 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^6 is a hydrocarbyl or substituted hydrocarbyl group having from 4 to about 15 carbon atoms and x is an average number from 1 to about 60;

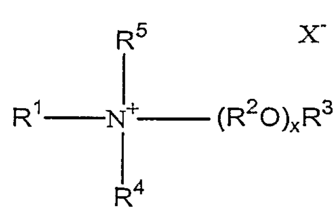
(n) dialkoxylated quaternary ammonium salts having the formula:



(33)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^4 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x and y are independently an average number from 1 to about 40, and X- is an agriculturally acceptable anion;

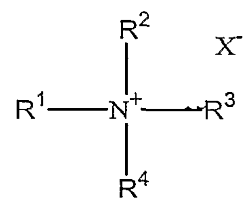
(o) monoalkoxylated quaternary ammonium salts having the formula:



(34)

wherein R^1 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X- is an agriculturally acceptable anion;

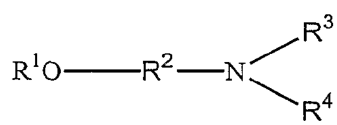
(p) quaternary ammonium salts having the formula:



(35)

wherein R^1, R^3 and R^4 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and X- is an agriculturally acceptable anion;

(q) etheramines having the formula:

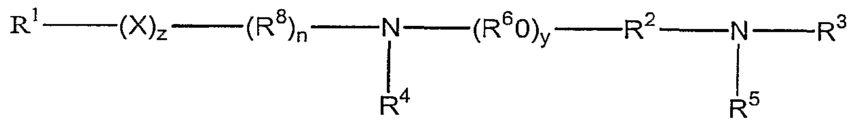


(36)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^3 and R^4 are independently hydrogen, hydrocarbyl or

substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^5O)_xR^6$, R^5 in each of the $x(R^5\text{-}O)$ groups is independently C_2-C_4 alkylene, R^6 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 50;

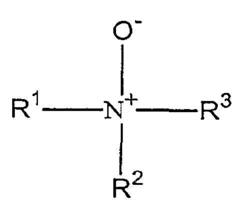
(r) diamines having the formula:



(37)

wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$; R^2 and R^8 are independently hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 30, X is -O-, $-N(R^6)$-, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^9)C(O)$-, $-C(O)N(R^9)$-, -S-, -SO-, or $-SO_2$-, y is 0 or an average number from 1 to about 30, n and z are independently 0 or 1, and R^9 is hydrogen or hydrocarbyl or substituted hydrocarbyl;

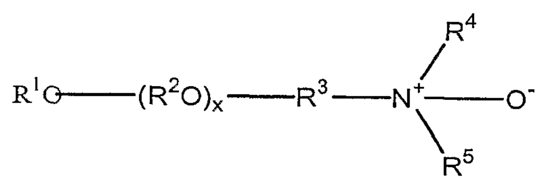
(s) amine oxides having the formula:



(38)

wherein R^1, R^2 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^4O)_xR^5$, or $-R^6(OR^4)_xOR^5$; R^4 in each of the x (R^4 O) groups is independently C_2-C_4 alkylene, R^5 is hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^6 is a hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, x is an average number from 1 to about 50, and the total number of carbon atoms in R^1, R^2 and R^3 is at least 8;

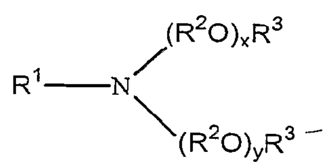
(t) alkoxylated amine oxides having the formula:



(39)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 is a hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^4 and R^5 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^6)_n-(R^2O)_yR^7$; R^6 is hydrocarbylene or substituted hydrocarbylene containing from 1 to about 6 carbon atoms, R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms, n is 0 or 1, and x and y are independently an average number from 1 to about 60;

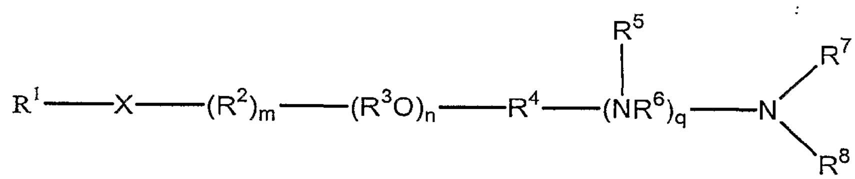
(u) dialkoxylated amines having the formula:



(40)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-R^4SR^5$, or $-(R^2O)_zR^3$, R^2 in each of the x (R^2O), y (R^2O) and z (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^4 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^5 is a linear or branched alkyl group having from about 4 to about 15 carbon atoms, and x, y and z are independently an average number from 1 to about 40, provided, however, that when R^1 is alkyl, either the sum of x and y is greater than 20 or R^3 is other than hydrogen;

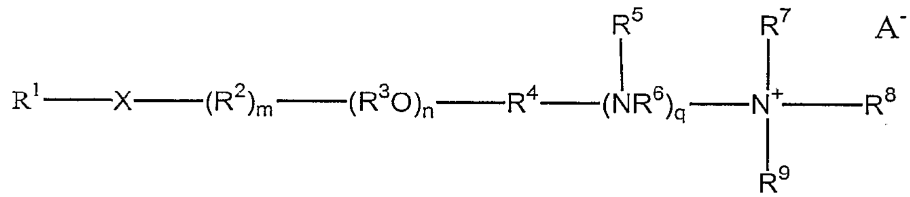
(v) aminated alkoxylated alcohols having the following chemical structure:



(41)

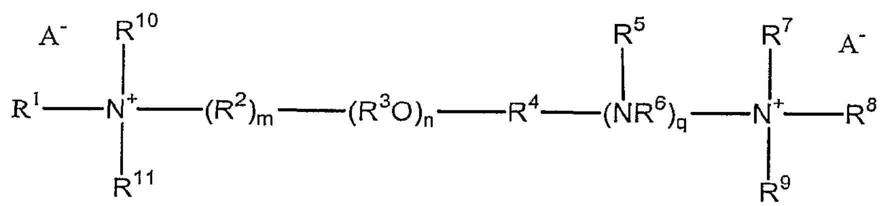
wherein R^1, R^7, R^8, and R^9 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{11})_s(R^3O)_vR^{10}$; X is -O-, -OC(O)-, -C(O)O-, $-N(R^{12})C(O)-$, $-C(O)N(R^{12})-$, -S-, -SO-, $-SO_2-$ or $-N(R^9)-$; R^3 in each of the n (R^3O) groups and the v (R^3O) groups is independently C_2-C_4 alkylene; R^{10} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{11} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^{12} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; m and s are each independently 0 or 1; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $-C(=NR^{12})-$, -C(S)-, or -C(O)-; q is an integer from 0 to 5; and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

(w) a quaternary ammonium, sulfonium or sulfoxonium salt having the following chemical structure:



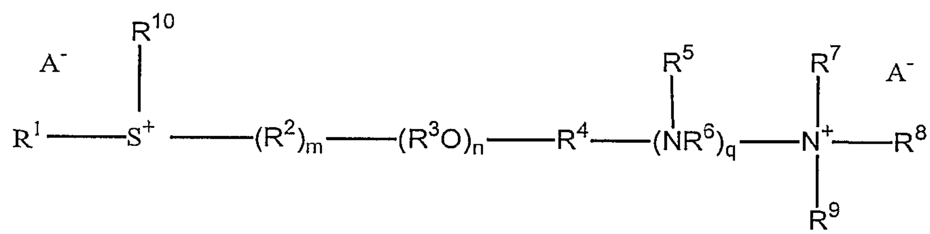
(43)

or



(44)

or



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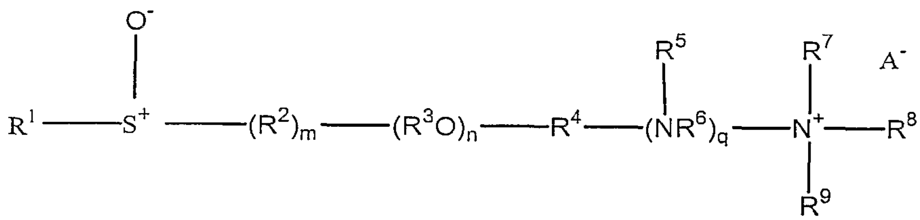
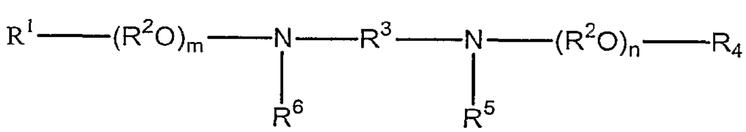
or



(46)

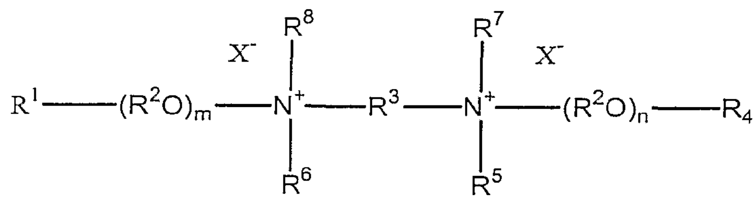
wherein R^1, R^7, R^8, R^9, R^{10} and R^{11} are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{13})_s(R^3O)_vR^{12}$; X is -O-, -OC(O)-, $-N(R^{14})C(O)-$, $-C(O)N(R^{14})-$, -C(O)O-, or -S-; R^3 in each of the n (R^3O) groups and v (R^3O) groups is independently C_2-C_4 alkylene; R^{12} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{13} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; m and s are each independently 0 or 1; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $-C(=NR^{12})-$, -C(S)-, or -C(O)-; R^{14} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, q is an integer from 0 to 5; R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each A^- is an agriculturally acceptable anion;

(x) a diamine or diammonium salt having the formula:



(47)

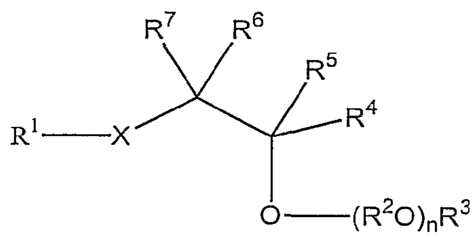
or



(48)

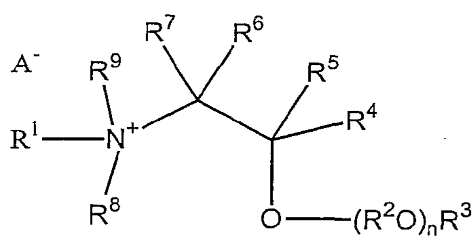
wherein R^1, R^4, R^5, R^6, R^7 and R^8 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the m (R^2O) and n (R^2O) groups and R^9 are independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or $-(R^2O)_pR_9-$, m and n are individually an average number from 0 to about 50, and p is an average number from 0 to about 60; or

(y) a compound of the formula:



(52)

or



(53)

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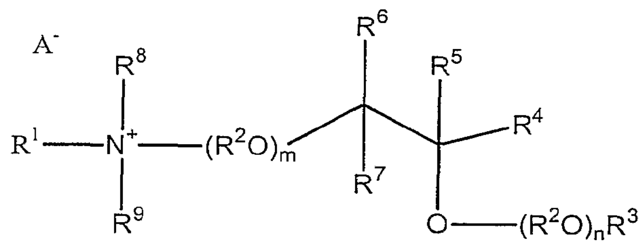

(56)

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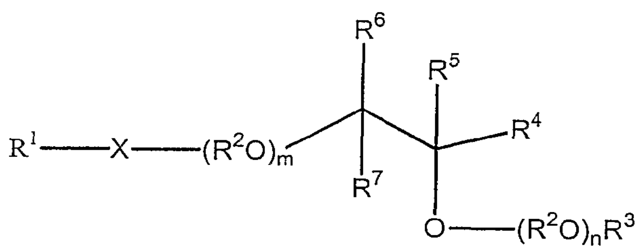

(54)

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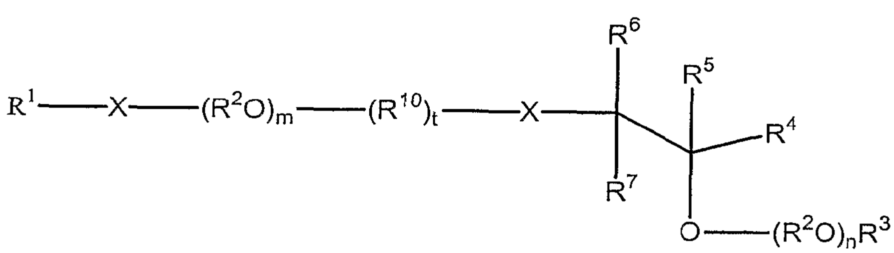

(55)

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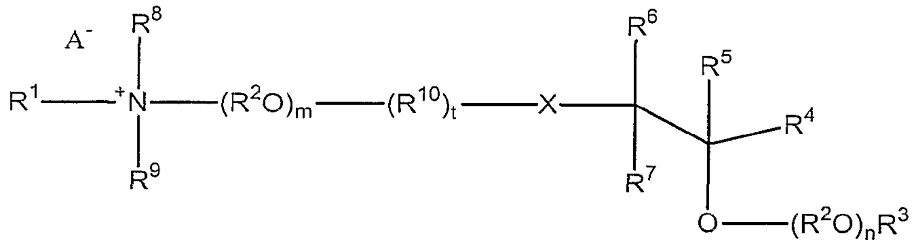
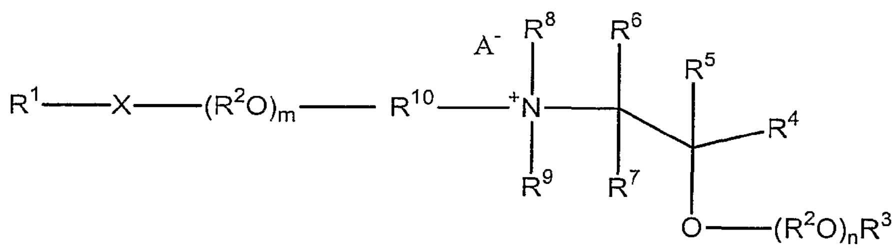


(57)

or



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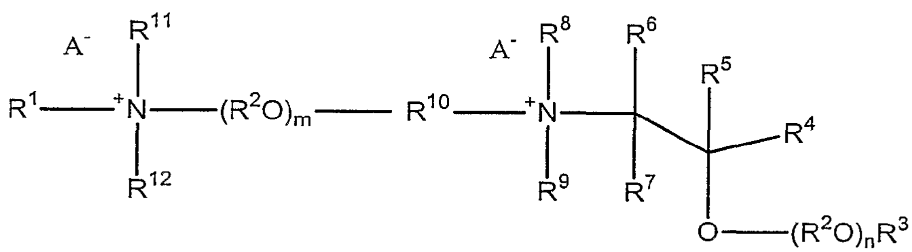


(59)

wherein R^1, R^9, and R^{12} are independently hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^2O)_pR^{13}$; R^2 in each of the m (R^2O), n (R^2O), p (R^2O) and q (R^2O) groups is independently C_2-C_4 alkylene; R^3, R^8, R^{11}, R^{13} and R^{15} are independently hydrogen, or a hydrocarbyl or substituted hydrocarbyl

having from 1 to about 30 carbon atoms; R^4 is $-(CH_2)_yOR^{13}$ or $-(CH_2)_yO(R^2O)_qR^3$; R^5, R^6 and R^7 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or R^4; R^{10} is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(CH_2)_zO(R^2O)_pR^3$; m, n, p and q are independently an average number from 1 to about 50; X is independently -O-, $-N(R^{14})-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^{15})C(O)-$, $-C(O)N(R^{15})-$, -S-, -SO-, or $-SO_2-$; t is 0 or 1; A- is an agriculturally acceptable anion; and y and z are independently an integer from 0 to about 30.

101. An aqueous herbicidal concentrate composition comprising:

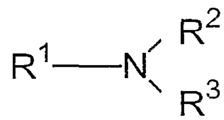
(i) a water-soluble herbicide dissolved in an aqueous medium, the water-soluble herbicide being present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

(ii) a surfactant component comprising at least one cationic surfactant and at least one nonionic surfactant, the surfactant component being present in a concentration sufficient to provide acceptable temperature stability of the composition such that the composition has a cloud point of at least about 50°C and a crystallization point not greater than about 0°C.

102. The composition of claim 101 wherein the cloud point is at least about 60°C.

103. The composition of claim 101 wherein said surfactant component comprises one or more amine or quaternary ammonium salt compounds, each of which comprises an alkyl or aryl substituent having from about 4 to about 16 carbon atoms and not more than ten ethylene oxide linkages within the compound, said compounds being present in an amount which enhances the compatibility of said surfactant component with the herbicide.

104. The composition of claim 103 wherein said compounds are selected from the group consisting of amines or quaternary ammonium salts having the formula:



(5)

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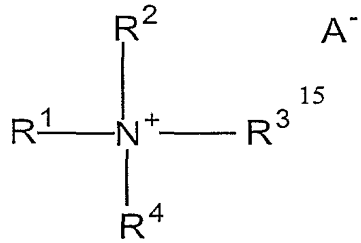
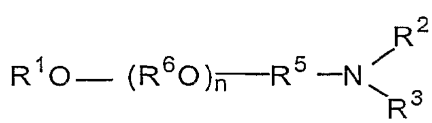
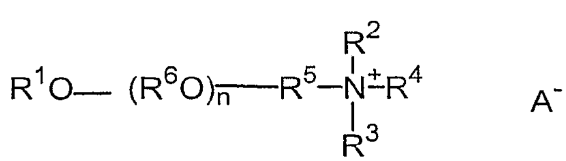


or (6)



(7)

or



(8)

wherein R^1 is linear or branched alkyl or aryl having from about 4 to about 16 carbon atoms, R^2 is hydrogen, methyl, ethyl, or $-(CH_2CH_2O)_xH$, R^3 is hydrogen, methyl,

ethyl, or $-(CH_2CH_2O)_yH$ wherein the sum of X and y is not more than about 5; R^4 is hydrogen or methyl; R^6 in each of the n (R^6O) groups is independently C_2-C_4 alkylene; R^5 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; and A- is an agriculturally acceptable anion.

105. The composition of claim 101 wherein the herbicide is glyphosate or a salt or ester thereof.

106. The composition of claim 105 wherein the glyphosate is predominantly in the form of the potassium, monoammonium, diammonium, sodium, monoethanolamine, n-propylamine, ethylamine, ethylenediamine, hexamethylenediamine or trimethylsulfonium salt thereof.

107. The composition of claim 106 wherein the glyphosate is predominantly in the form of the potassium salt thereof.

108. The composition of claim 101 wherein the surfactant component is in a stable emulsion.

109. The composition of claim 101 wherein the surfactant component is in a stable suspension.

110. The composition of claim 101 wherein the surfactant component is in a stable dispersion.

111. The composition of claim 101 wherein the surfactant component is in a solution.

112. The composition of claim 101 wherein the composition is stable after storage at 50 C for at least 14 days.

113. The composition of claim 101 wherein the composition is stable after storage at 50 C for about 28 days.

114. The composition of claim 101 wherein the composition has a viscosity of less than about 1000 centipoise at 0°C at 45/s shear rate.

115. The composition of claim 101 wherein said surfactant component is selected such that the composition exhibits no crystallization of said herbicide when stored at a temperature of about 0 C for a period of about 7 days.

116. The composition of claim 101 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said aqueous medium in an amount of about 310 to about 600 grams of acid equivalent per liter of the composition.

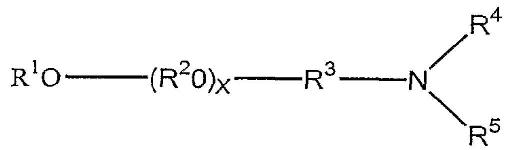
117. The composition of claim 116 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said aqueous medium in an amount of about 360 to about 600 grams of acid equivalent per liter of the composition.

118. The composition of claim 117 wherein said glyphosate, predominantly in the form of the potassium salt thereof, is in solution in said aqueous medium in an amount of about 400 to about 600 grams of acid equivalent per liter of the composition.

119. The composition of claim 101 wherein the total amount of surfactant is from about 20 to about 300 grams per liter of the composition.

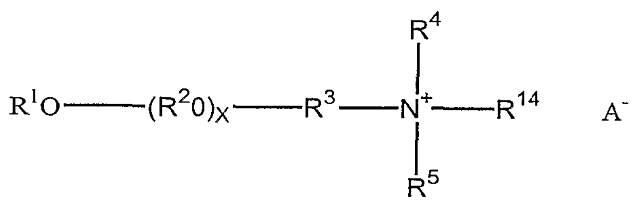
120. The composition of claim 101 wherein the composition is substantially homogeneous upon storage at 50°C for one week.

121. The composition of claim 101 wherein said cationic surfactant comprises (a) aminated alkoxylated alcohol having the formula:



(9)

or

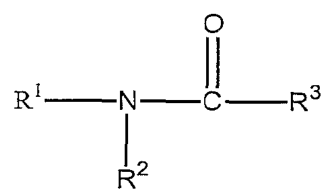


(10)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 and R^6 are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-C(=S)NR^{12}R^{13}$ or together with R^5 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^5 is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, $-C(=S)NR^{12}R^{13}$, or together with R^4 and the nitrogen atom to which they are attached, form a cyclic or heterocyclic ring; R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted

hydrocarbyl, R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, hydroxy substituted hydrocarbyl, $-(R^6)_n-(R^2O)_yR^7$, $-C(=NR^{11})NR^{12}R^{13}$, $-C(=O)NR^{12}R^{13}$, or $-C(=S)NR^{12}R^{13}$, n is 0 or 1, x and y are independently an average number from 1 to about 60, and A- is an agriculturally acceptable anion;

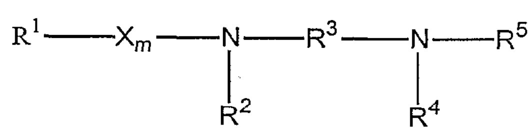
(b) hydroxylated amides having the formula:



(11)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

(c) diamines having the formula:

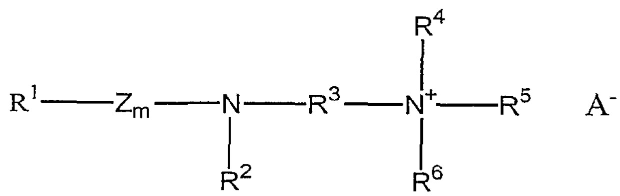


(13)

wherein R^1, R^2 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^4 and R^{10} are independently hydrogen or

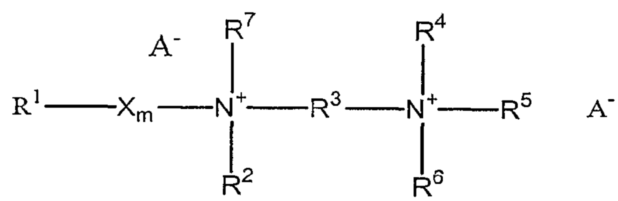
hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, and X is -C(O)- or $-SO_2-$;

(d) mono- or di-ammonium salts having the formula:



(14)

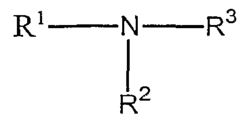
or



(15)

wherein R^1, R^2, R^4, R^5 and R^7 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms or $-R^8(OR^9)_nOR^{10}$, R^6 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^8 and R^9 are individually hydrocarbylene or substituted hydrocarbylene having from 2 to about 4 carbon atoms, R^{10} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, m is 0 or 1, n is an average number from 0 to about 40, X is -C(O)- or $-SO_2-$, Z is -C(O)-, and A^- is an agriculturally acceptable anion;

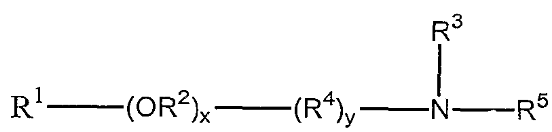
(e) poly(hydroxyalkyl)amines having the formula:



(16)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-R^4OR^5$, R^2 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^3 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

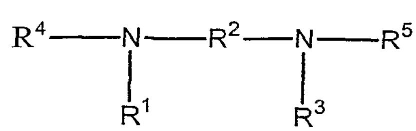
(f) alkoxylated poly(hydroxyalkyl)amines having the formula:



(19)

wherein R^1 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene; R^4 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 30 carbon atoms, R^5 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl; x is an average number from 0 to about 30, and y is 0 or 1;

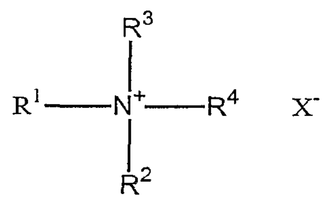
(g) di-poly(hydroxyalkyl)amine having the formula:



(22)

wherein R^1 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 22 carbon atoms, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms, and R^4 and R^5 are independently hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl;

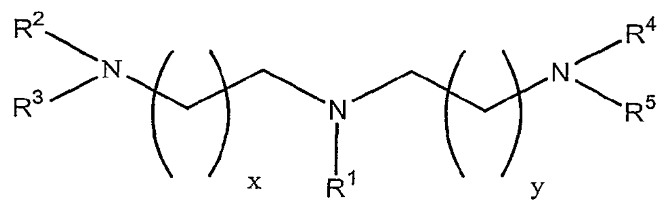
(h) quaternary poly(hydroxyalkyl)amine salts having the formula:



(24)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from about 4 to about 30 carbon atoms or $-X_m-(R^4O)_yR^5$, R^2 and R^3 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydroxyalkyl, polyhydroxyalkyl, or poly(hydroxyalkyl)alkyl, X- is an agriculturally acceptable anion; R^4 in each of the $y(R^4O)$ groups is independently C_2-C_4 alkylene; R^5 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms; X is hydrocarbylene or substituted hydrocarbylene having from 2 to about 18 carbon atoms; m is 0 or 1; and y is an average number from 0 to about 30;

(i) triamines having the formula:

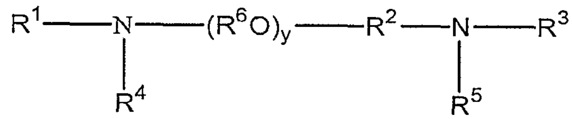


(27)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^8)_s(R^7O)_nR^6$;

R^6 is hydrogen or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^7 in each of the n (R^7O) groups is independently C_2-C_4 alkylene; R^8 is hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, n is an average number from 1 to about 10, s is 0 or 1, and x and y are independently an integer from 1 to about 4;

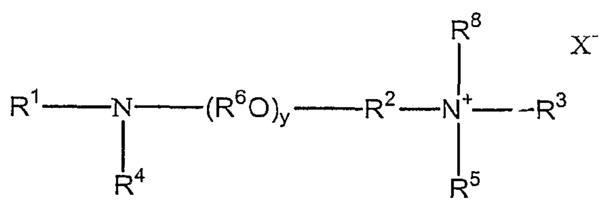
(j) diamines having the formula:



(28)

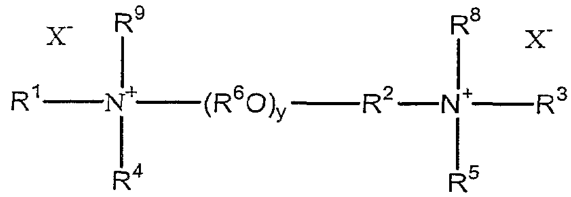
wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $C(=NR^{11})NR^{12}R^{13}$-, $-C(=O)NR^{12}R^{13}$-, $-C(=S)NR^{12}R^{13}$-, $-C(=NR^{12})$-, -C(S)-, or -C(O)-, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, R^{11}, R^{12} and R^{13} are hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x is an average number from 1 to about 50, and y is an average number from 0 to about 60;

(k) mono- or di-quaternary ammonium salts having the formula:



(30)

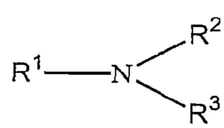
or



(29)

wherein R^1, R^3, R^4, R^5, R^8 and R^9 are independently hydrogen, polyhydroxyalkyl, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$, R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, x is an average number from 1 to about 30, y is an average number from about 3 to about 60, and X^- is an agriculturally acceptable anion;

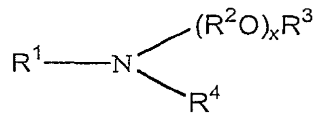
(l) a secondary or tertiary amine having the formula:



(31)

wherein R^1 and R^2 are hydrocarbyl having from 1 to about 30 carbon atoms, and R^3 is hydrogen or hydrocarbyl having from 1 to about 30 carbon atoms;

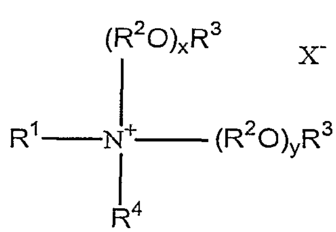
(m) monoalkylated amines having the formula:



(32)

wherein R^1 and R^4 are independently hydrocarbyl or substituted hydrocarbyl groups having from 1 to about 30 carbon atoms or $-R^5SR^6$, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^5 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^6 is a hydrocarbyl or substituted hydrocarbyl group having from 4 to about 15 carbon atoms and x is an average number from 1 to about 60;

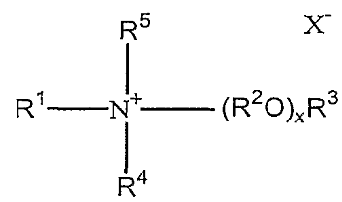
(n) dialkoxylated quaternary ammonium salts having the formula:



(33)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^4 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, x and y are independently an average number from 1 to about 40, and X- is an agriculturally acceptable anion;

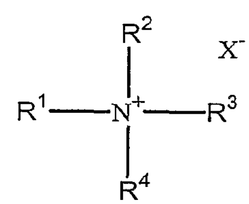
(o) monoalkoxylated quaternary ammonium salts having the formula:



(34)

wherein R^1 and R^5 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^4 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 60, and X- is an agriculturally acceptable anion;

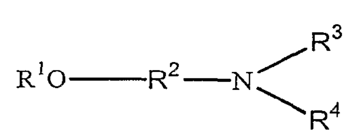
(p) quaternary ammonium salts having the formula:



(35)

wherein R^1, R^3 and R^4 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, and X- is an agriculturally acceptable anion;

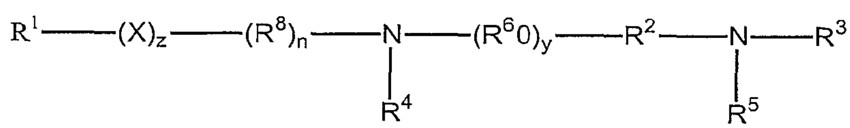
(q) etheramines having the formula:



(36)

wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^3 and R^4 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^5O)_xR^6$, R^5 in each of the $x(R^5\text{-}O)$ groups is independently C_2-C_4 alkylene, R^6 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 50;

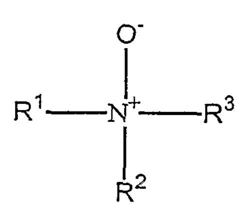
(r) diamines having the formula:



(37)

wherein R^1, R^3, R^4 and R^5 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^6O)_xR^7$; R^2 and R^8 are independently hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, R^6 in each of the x (R^6O) and y (R^6O) groups is independently C_2-C_4 alkylene, R^7 is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms, x is an average number from 1 to about 30, X is -O-, $-N(R^6)$-, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^9)C(O)$-, $-C(O)N(R^9)$-, -S-, -SO-, or $-SO_2$-, y is 0 or an average number from 1 to about 30, n and z are independently 0 or 1, and R^9 is hydrogen or hydrocarbyl or substituted hydrocarbyl;

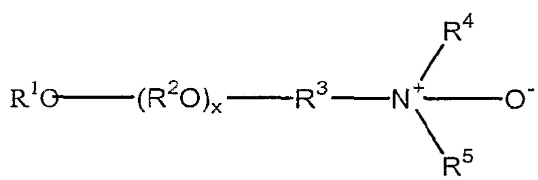
(s) amine oxides having the formula:



(38)

wherein R^1, R^2 and R^3 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^4O)_xR^5$, or $-R^6(OR^4)_xOR^5$; R^4 in each of the x (R^4 O) groups is independently C_2-C_4 alkylene, R^5 is hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^6 is a hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms, x is an average number from 1 to about 50, and the total number of carbon atoms in R^1, R^2 and R^3 is at least 8;

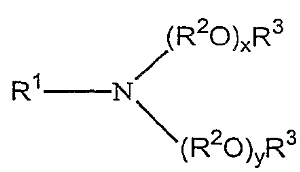
(t) alkoxylated amine oxides having the formula:



(39)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^2 in each of the x (R^2O) and y (R^2O) groups is independently C_2-C_4 alkylene; R^3 is a hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^4 and R^5 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-(R^6)_n-(R^2O)_yR^7$; R^6 is hydrocarbylene or substituted hydrocarbylene containing from 1 to about 6 carbon atoms, R^7 is hydrogen or a linear or branched alkyl group having 1 to about 4 carbon atoms, n is 0 or 1, and x and y are independently an average number from 1 to about 60;

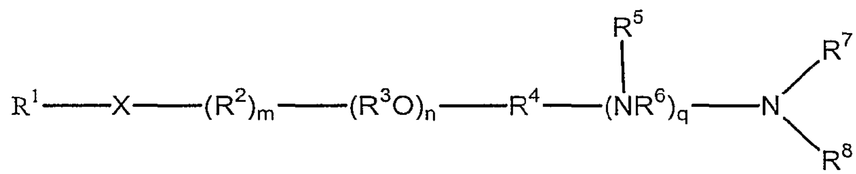
(u) dialkoxylated amines having the formula:



(40)

wherein R^1 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, $-R^4SR^5$, or $-(R^2O)_zR^3$, R^2 in each of the x (R^2O), y (R^2O) and z (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 22 carbon atoms, R^4 is a linear or branched alkyl group having from about 6 to about 30 carbon atoms, R^5 is a linear or branched alkyl group having from about 4 to about 15 carbon atoms, and x, y and z are independently an average number from 1 to about 40, provided, however, that when R^1 is alkyl, either the sum of x and y is greater than 20 or R^3 is other than hydrogen;

(v) aminated alkoxylated alcohols having the following chemical structure:

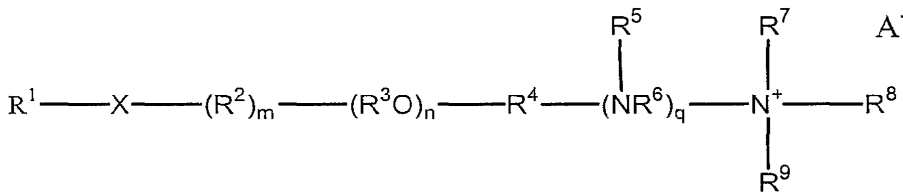


(41)

wherein R^1, R^7, R^8, and R^9 are each independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{11})_s(R^3O)_vR^{10}$; X is -O-, -OC(O)-, -C(O)O-, $-N(R^{12})C(O)-$, $-C(O)N(R^{12})-$, -S-, -SO-, $-SO_2-$ or $-N(R^9)-$; R^3 in each of the n (R^3O) groups and the v (R^3O) groups is independently C_2-C_4 alkylene; R^{10} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{11} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^{12} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; m and s are each independently 0 or 1; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon

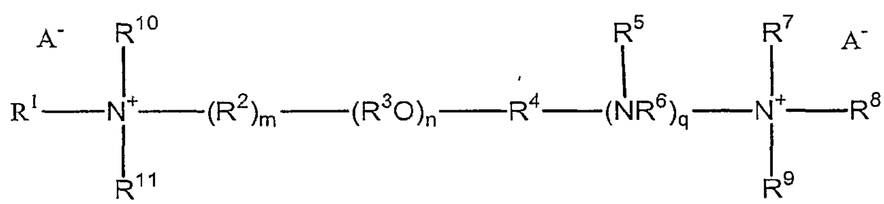
atoms, -C(=NR^{12})-, -C(S)-, or -C(O)-; q is an integer from 0 to 5; and R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms;

(w) a quaternary ammonium, sulfonium or sulfoxonium salt having the following chemical structure:



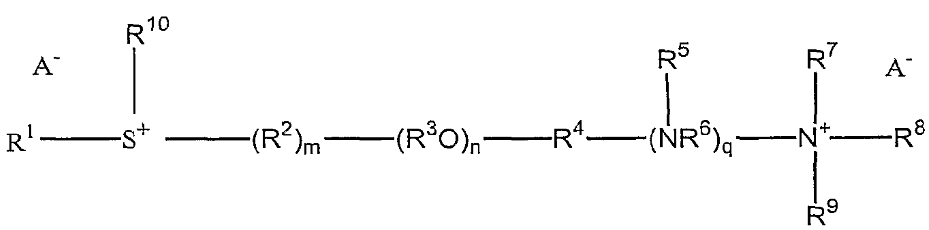
(43)

or



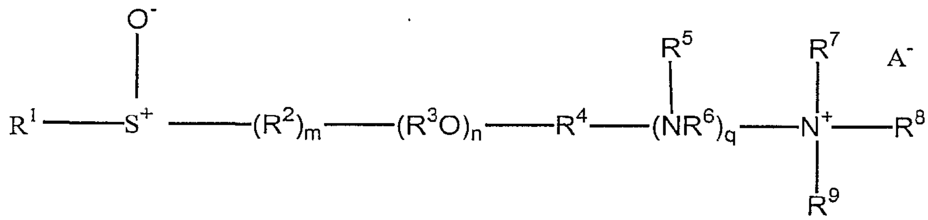
(44)

or



(45)

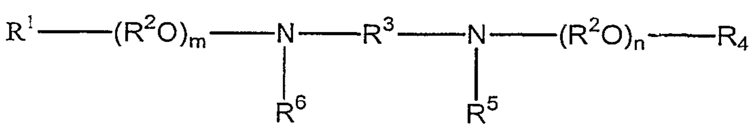
or



(46)

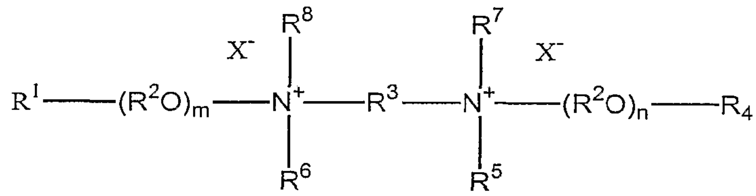
wherein R^1, R^7, R^8, R^9, R^{10} and R^{11} are independently hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^{13})_s(R^3O)_vR^{12}$; X is -O-, -OC(O)-, $-N(R^{14})C(O)-$, $-C(O)N(R^{14})-$, -C(O)O-, or -S-; R^3 in each of the n (R^3O) groups and v (R^3O) groups is independently C_2-C_4 alkylene; R^{12} is hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms; n is an average number from 1 to about 60; v is an average number from 1 to about 50; R^2 and R^{13} are each independently hydrocarbylene or substituted hydrocarbylene having from 1 to about 6 carbon atoms; m and s are each independently 0 or 1; R^4 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 6 carbon atoms; R^6 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, $-C(=NR^{12})-$, -C(S)-, or -C(O)-; R^{14} is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, q is an integer from 0 to 5; R^5 is hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; and each A^- is an agriculturally acceptable anion;

(x) a diamine or diammonium salt having the formula:



(47)

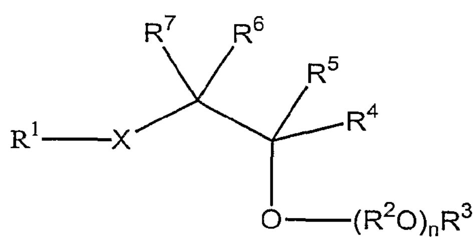
or



(48)

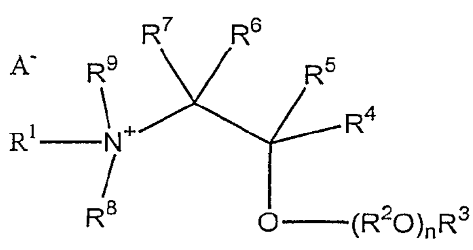
wherein R^1, R^4, R^5, R^6, R^7 and R^8 are independently hydrogen or hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the m (R^2O) and n (R^2O) groups and R^9 are independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene having from about 2 to about 6 carbon atoms or $-(R^2O)_pR_9-$, m and n are individually an average number from 0 to about 50, and p is an average number from 0 to about 60; or

(y) a compound of the formula:



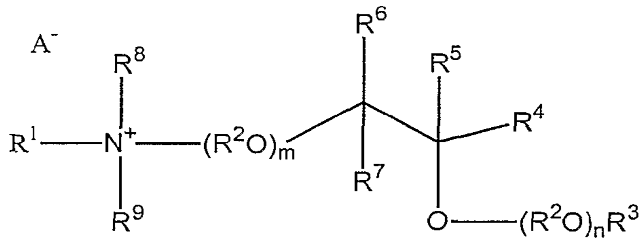
(52)

or



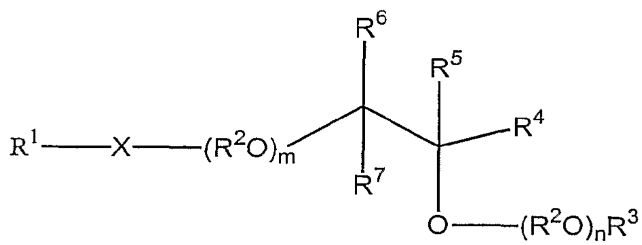
(53)

or



(56)

or



(54)

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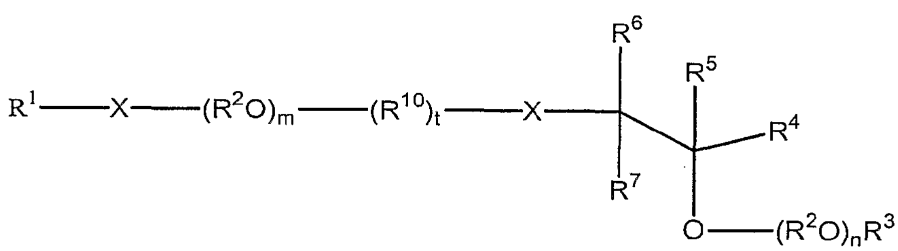

(55)

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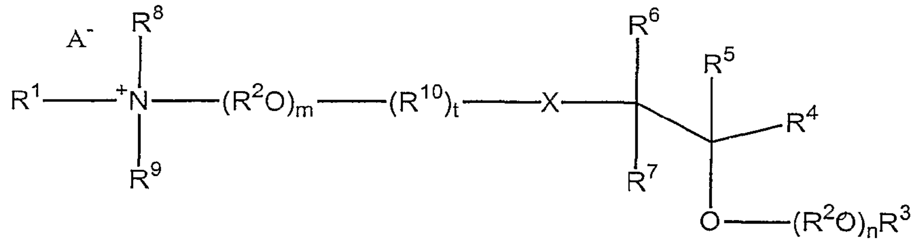

(57)

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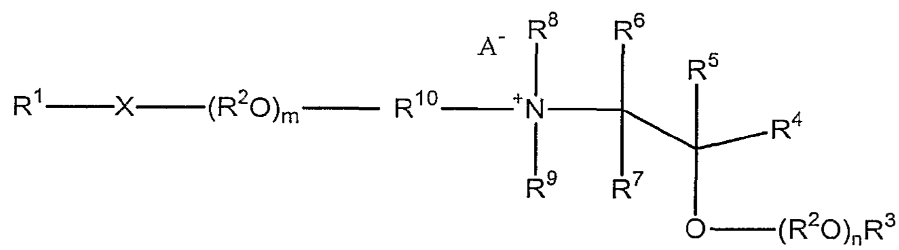
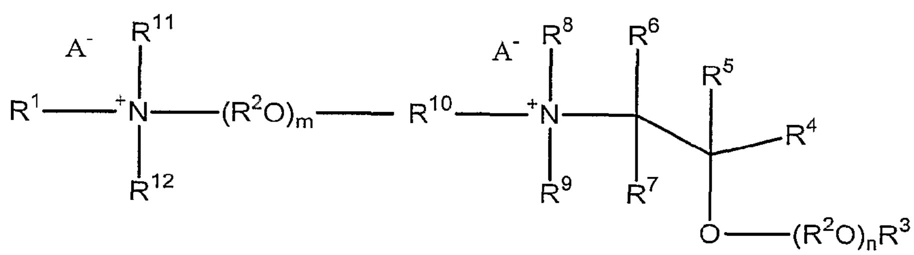


(58)

or



(59)

wherein R^1, R^9, and R^{12} are independently hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(R^2O)_pR^{13}$; R^2 in each of the m (R^2O), n (R^2O), p (R^2O) and q (R^2O) groups is independently C_2-C_4 alkylene; R^3, R^8, R^{11}, R^{13} and R^{15} are independently hydrogen, or a hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms; R^4 is $-(CH_2)_yOR^{13}$ or $-(CH_2)_yO(R^2O)_qR^3$; R^5, R^6 and R^7 are independently hydrogen, hydrocarbyl or substituted hydrocarbyl

having from 1 to about 30 carbon atoms, or R^4; R^{10} is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms; R^{14} is hydrogen, hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, or $-(CH_2)_zO(R^2O)_pR^3$; m, n, p and q are independently an average number from 1 to about 50; X is independently -O-, $-N(R^{14})-$, -C(O)-, -C(O)O-, -OC(O)-, $-N(R^{15})C(O)-$, $-C(O)N(R^{15})-$, -S-, -SO-, or $-SO_2-$; t is 0 or 1; A- is an agriculturally acceptable anion; and y and z are independently an integer from 0 to about 30.

122. The composition of claim 101 wherein said nonionic surfactant comprises

(a) an alkoxylated alcohol having the formula:

$$R^1O\text{——}(R^2O)_xR^3 \tag{49}$$

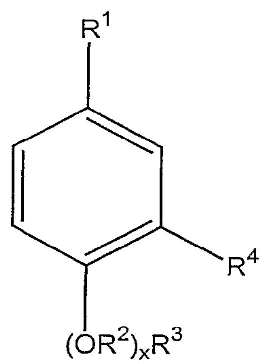
wherein R^1 is hydrocarbyl or substituted hydrocarbyl having from 1 to about 30 carbon atoms, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60;

(b) dialkoxylated alcohols having the formula:

$$R^1(OR^2)_xO\text{——}R^3\text{——}O\text{——}(R^2O)_yR^1 \tag{50}$$

wherein R^1 is independently hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, R^2 in each of the x (R^2O) and the y (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrocarbylene or substituted hydrocarbylene having from 2 to about 30 carbon atoms, and x and y are independently an average number from 1 to about 60; or

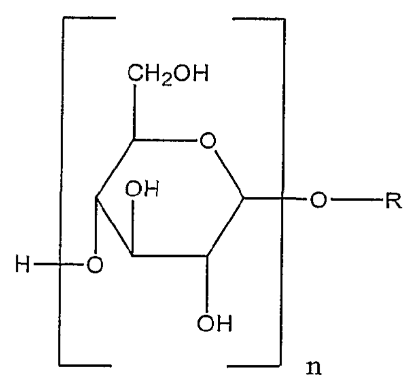
(c) alkoxylated dialkylphenols having the formula:



(51)

wherein R^1 and R^4 are independently hydrogen, or a linear or branched alkyl group having from 1 to about 30 carbon atoms and at least one of R^1 and R^4 is an alkyl group, R^2 in each of the x (R^2O) groups is independently C_2-C_4 alkylene, R^3 is hydrogen, or a linear or branched alkyl group having from 1 to about 4 carbon atoms, and x is an average number from 1 to about 60; or

(d) a glycoside having the formula:



(61)

wherein n is the degree of polymerization, or number of glycose groups, and R is a branched or straight chain alkyl group preferably having from 4 to 18 carbon atoms, or a mixture of alkyl groups having an average value within the given range.

123. A temperature stable uniform liquid herbicidal concentratecomprising:

an aqueous phase having a water soluble herbicide dissolved therein, the water soluble herbicide being present in a concentration that is biologically effective when the composition is diluted in a suitable volume of water and applied to the foliage of a susceptible plant;

an oil phase intimately and uniformly mixed with said aqueous phase, aid oil phase comprising a substantially water immiscible organic solvent; and

a surfactant component comprising a cationic surfactant and a nonionic surfactant, the surfactant component being present in a concentration sufficient to maintain the stability of the concentrate between a cloud point of at least about 50 C and a crystallization point not greater than about -10 C.

124. A composition of claim 123 wherein the composition is an optically transparent stable concentrate.

125. The composition of claim 123 wherein the concentrate is a microemulsion.